

Evidence based practice guidelines for management of low back pain: physical therapy implications

Diretrizes de prática clínica baseada em evidências para avaliação e tratamento de lombalgia: implicações para fisioterapia

Carlos E. Ladeira

Abstract

Background: Low back pain (LBP) is the most common disorder seen in physical therapy practice. There are several hundred clinical trials on the management of LBP. To summarize these trials, researchers wrote Evidence Based Practice (EBP) guidelines. This article reviewed the implications of EBP guidelines recommendations for physical therapy practice. **Objectives:** To review the recommendations for conservative management of LBP published in EBP guidelines since 2002. **Methods:** Searches were performed on the following databases: Google web searching engine, Medline, Cochrane Library, and the Guideline Clearing House. Guidelines published in English and addressing conservative management of LBP were included. **Results:** Thirteen multidisciplinary and three mono-disciplinary guidelines met the inclusion criteria. LBP was triaged into three groups: with red flags, with radiculopathy, or non-specific. Patients without red flags could be safely managed without specialist referral. Patient education was recommended for all patients with LBP. There was an agreement to advise spine manipulation for patients with acute and sub-acute non-specific LBP. There was a consensus to recommend exercises for acute, sub-acute, and chronic LBP. Few guidelines addressed conservative management of LBP with radiculopathy. Overall, the guidelines did not offer specific advice for manipulation (hypomobility or instability) and exercise (stabilization or directional preference). **Conclusion:** Multidisciplinary guidelines focused on primary care and lacked details significant for physical therapy practice. There is a need for mono-disciplinary physical therapy guidelines to improve the balance between evidence and professional relevance.

Keywords: evidence based practice; guidelines; physical therapy; low back pain.

Resumo

Contextualização: Lombalgia é o sintoma mais comum tratado por Fisioterapeutas. Existem centenas de estudos controlados aleatorizados que lidam com o tratamento de lombalgias. Para resumir tais centenas de artigos, pesquisadores escreveram guias de prática clínica baseados na evidência (PBE) para orientar clínicos a lidarem com tal problema. **Objetivos:** Revisar as implicações clínicas dos guias de PBE para o tratamento de lombalgia. **Métodos:** Esta revisão incluiu guias publicados a partir de 2002. A pesquisa dos guias foi feita nos seguintes websites e base de dados: Google, Medline, Cochrane Library e a Guideline Clearing House. Guias escritos em inglês e que abordavam o tratamento conservador de lombalgia foram incluídos. **Resultados:** As diretrizes (13 multidisciplinares e três monodisciplinares) dividiram a lombalgia em três grupos: com bandeira vermelha, com radiculopatia e não específica. Lombalgias sem bandeira vermelha podem ser tratadas sem encaminhamento médico. A educação do paciente sobre o curso natural benigno da lombalgia foi recomendado para pacientes sem bandeira vermelha. A manipulação foi recomendada para lombalgia não específica aguda e subaguda e exercícios foram recomendados para lombalgia não específica aguda, subaguda e crônica. Poucas diretrizes fizeram recomendações para lombalgia com radiculopatia. Elas não ofereceram recomendações específicas para manipulação (hipomobilidade versus instabilidade) e exercícios (estabilização versus preferência direcional). **Conclusão:** A maioria das diretrizes era multidisciplinar (cuidado primário de lombalgia), com poucos detalhes relevantes para o Fisioterapeuta. Faltam diretrizes monodisciplinares de Fisioterapia para equilibrar evidência científica com relevância clínica profissional.

Palavras-chave: prática baseada em evidências; Fisioterapia; lombalgia.

Received: 28/04/2011 – **Revised:** 06/05/2011 – **Accepted:** 07/06/2011

Introduction : : : .

Low back pain (LBP) is the fifth most common reason for a patient to visit a physician's office in the United States of America (USA)¹. LBP is the most common musculoskeletal condition seen by physical therapists in the USA². Low back pain is the most common musculoskeletal problem seen in Australia³. In Italy, LBP is the third most common reason for a medical visit⁴. LBP reached an epidemic rate worldwide. The lifetime incidence of an acute episode of LBP ranges from 60% to 90%, and 30% of those with LBP may develop a chronic condition^{2,5}. LBP may prevent patients from returning to work and impair individuals to engage in activities required for daily living. LBP health-care costs may vary from \$20 to \$50 billion dollars a year in the USA⁶. Because of the socio-economic consequences of LBP, it is important that physical therapists engage in the most efficient and effective management practices available for LBP. Evidence-based practice (EBP) is the gold standard clinical method for clinicians to reach the best possible patient outcomes with the lowest health-care cost^{2,7,8}. The importance of engaging in EBP for LBP becomes evident in light of stringent health insurance guidelines and the increasingly high cost of LBP care.

EBP is the process of making clinical decisions based on an integration of the best available evidence with patient values and clinical expertise⁷. Because of the high incidence, prevalence, and recurrence rates of LBP, at least five hundred randomized controlled trials on the management of LBP have been conducted. To facilitate the use of EBP, researchers have summarized these randomized controlled trials into clinical practice guidelines to help clinicians to make decisions about the best healthcare for LBP. Clinical practice guidelines are "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances. Their purpose is to make explicit recommendations with a definite intent to influence what clinicians do"⁹. Clinical practice guidelines function to influence clinical decision making by presenting the clinician with clear recommendations about what to do in particular situations. The purpose of this article was to discuss the recommendations of EBP guidelines for the management of LBP and their implications for physical therapy practice; more specifically, the implications of EBP guideline recommendations for direct access and physician referral as well as the conservative management of LBP with exercise, physical activity, spine manipulation (low velocity non-thrust and high velocity amplitude thrust techniques), and electro-physical agents; for the acute, sub-acute, and chronic stages of LBP.

Methods : : : .

Only guidelines published in English were included. To be included, the guidelines had to have recommendations for: (a) specialist referral, (b) conservative care (non-invasive and non-pharmacological intervention) for non-specific LBP, and (c) conservative care for LBP with radiculopathy. We included intervention recommendations with grade A or B level of evidence (A = strong recommendation based on multiple high quality studies [systematic review or randomized controlled trial], B = moderate recommendation based on at least a single high quality study). The review was performed in the Google web searching engine and the Medline, the Cochrane Library, and the Guideline Clearing House databases. The search terms guidelines, practice guidelines, evidence based practice, and back pain were used.

Results : : : .

Practice Guidelines

There were seventeen EBP guidelines for the management of LBP published prior to 2001¹⁰, these were not included in the current review because they were outdated and, based on the AGREE Instrument for assessment of clinical practice guidelines; they had poor methodology quality¹⁰. The current review included guidelines published from 2002 to 2010 because they had good methodology quality and also because they were updated to reflect contemporary practice^{11,12}. Clinical guidelines need to be updated whenever new information becomes available in a clinical area¹² and in physical therapy practice, there have been new clinical trials based on a new LBP classification system¹³⁻¹⁵ that were not discussed in the literature prior to 2001.

The search identified seventeen EBP guidelines^{1,3-5,16-28} for the management of back pain that were published on or after the year of 2002. The American Osteopathic Association guideline was not included in this review because it only evaluated the use of osteopathic manipulative therapy for the management of back pain, it did not evaluate common conservative means to manage back pain (i.e. physical activity, exercise, education, electro-physical agents, behavioral counseling) and it excluded spine manipulation practiced by health care professionals other than osteopathic physicians²⁶. The remaining sixteen guidelines were included in the present review.

The reviewed guidelines stressed the importance of history taking and physical examination to triage patients with LBP into: (a) patients likely to have serious pathologies, (b) patients with LBP and radiculopathy, and (c) patients with non-specific LBP. This initial LBP triage separated patients with red and yellow flag signs and symptoms from patients who could be managed without

specialist referral, without additional diagnostic imaging tests, and without invasive procedures^{1,4,5,16,19,20,22-25,28}. Red flags were designed to identify patients with LBP associated with specific spine pathologies that require physician specialist referral^{1,5,23}. Yellow flags were designed to identify patients with psychiatric disorders, emotional problems, or socioeconomic issues who could develop chronic pain and long-term disability (including work loss), and who might require specialist referral¹⁹⁻²¹.

Patients requiring specialist referral

All sixteen guidelines identified for this study made recommendations for specialist referral^{1,3-5,16-25,27,28}. Any patient who presented with red flags indicating suspicion of cancer, infection, cauda equina syndrome, spondyloarthritis, spinal fracture, visceral (gastrointestinal and genitourinary) referred pain, and abdominal aortic aneurism need to be sent to a specialist (Table 1).

In addition to red flags indicating the likelihood of serious spinal pathology, the published EBP guidelines for LBP also described yellow flags for patients who should be referred to psychologists and other behavioral therapists. From sixteen

EBP guidelines, thirteen discussed or mentioned yellow flags (Table 2) as a predictor for prolonged disability^{1,3-5,16-20,22,24,27,28}. In the initial management of patients with LBP (first four or six weeks), only patients with clear signs of psychopathology require specialist referral (e.g.; depression, anxiety, somatoform, and substance abuse disorders)^{19,20}. Patients with kinesiophobia²⁹ and fear avoidance behavior (FAB) do not require specialist referral in this initial management of LBP^{19,20}.

Interventions for acute low back pain

EBP guidelines defined acute LBP based on duration of symptoms after onset rather than intensity of symptoms (Tables 3 and 4). Four guidelines^{1,4,22,25} defined acute LPB as pain lasting four weeks or less. Nine guidelines^{5,17,18,20,21,23,24,27,28} defined acute LBP as pain lasting six weeks or less. Three guidelines^{3,16,19} defined acute LBP as pain lasting less than twelve weeks. Sixteen guidelines^{1,3-5,16-25,27,28} addressed the management of non-specific acute LBP with conservative intervention (Table 3). The physical therapy intervention recommendations for patients with non-specific LBP were fairly consistent among the guidelines.

Table 1. Red flags for patients with low back pain.

Pathology	Signs and Symptoms
Cauda Equina Syndrome	Saddle anaesthesia or paraesthesia, perianal/perineal sensory loss
	Positive straight leg raise testing, multiple motor deficits
	Bowel/Bladder dysfunction. Fecal/urinary incontinence
Spinal Fracture	Severe (paralysis rather than paresis) or bilateral neurological compromise, Recent violent trauma (fall from big height, car accident)
	Minor trauma in patients with history of osteoporosis, older age
	Structural bone deformity, prolonged corticosteroid use
Cancer or Infection	Severe central back pain relieved by lying down
	Age above 50 and below 20 years old
	Constitutional symptoms (e.g.; fever, weight loss, chills, malaise).
	History of cancer (malignancies), pain on the thoracic spine
	Recent bacterial infection (e.g.; urinary tract, respiratory tract)
	Immune depression (e.g.; HIV*, chemotherapy), Intra-venous drug abuse
Abdominal aortic aneurysm	Prolonged use of corticosteroids, recent puncture wound or surgery, diabetes, spinal tenderness to percussion
	Recent or fast developing spine deformity (e.g.; scoliosis)
	Non-mechanical (e.g.; not better when lying down) or progressive pain, failure to improve with treatment in 4 to 6 weeks, unremitting night time pain
Spondylo-Arthritis	Age over 60, history of cardiovascular disease (e.g.; myocardial infarct or stroke)
	Pulsating mass on the abdomen, leg pain, thoracic pain
	Absence of aggravating features
Gastrointestinal or Genitourinary	Age lower than 45 years old, morning stiffness improved with exercise
	Alternating buttock pain, significant and persistent lumbar flexion restriction (positive Schobers test)
	Awakening because of back pain during second part of night
Gastrointestinal or Genitourinary	Oligo-arthritis or poly-arthritis, skin rashes, diarrhea, hypersensitivity to NSAIDs*.
	Abdominal or flank pain/tenderness, rebound tenderness, costo-vertebral angle tenderness,
	Reduced urine stream, reduced stool caliber, burning during urination, abnormal urine or stool coloration/smell,
Gastrointestinal or Genitourinary	Diarrhea, constipation, anuria, oliguria, polyuria,
	Abnormal menses, dyspareunia, painful erection

NSAIDs=Non-Steroidal Anti-inflammatory Drugs; HIV=Human immunodeficiency virus.

Table 2. Yellow flag for patients with low back pain.

Problem	Signs and Symptoms
Psychiatric disorders	Previous history of psychiatric disorders
	Anxiety that back problems are dangerous
	Anxious, depressed, stressed, social withdrawal
	Somatization; patient does not sleep well because of back pain
Socioeconomic issues	Occupation related: heavy lifting, uncertain work demand, unsociable working hours, high mental workload, prolonged time off work, forestry workers, dissatisfaction with work, lack of work support, problems with claims or compensation, no economic gain from resuming work
	Social or economic hardships (e.g.; divorce, death in the family, job loss)
	Overprotective family/partner, lack of social support
Behavior (including fear avoidance and kinesiophobia), and Attitudes	Inappropriate or limited belief on improvement or ability to work
	Reluctance to improve physical level, extended rest
	Expectation that passive treatment (physical agents, extended bed rest) is better than active participation (exercise, walking, working) to get better
	High fear avoidance behavior scale score
Miscellaneous	High kinesiophobia scale score
	Confusion about diagnosis and prognosis, misunderstandings about the cause of pain, negative experience with previous intervention for back pain, immigration status

Table 3. Evidence based practice guidelines intervention for non-specific acute low back pain.

Guidelines	Intervention
Pain lasting < 4 weeks (Education *)	
†Italian ⁴	Manipulation after 2-3 weeks and before 6 weeks
†American College of Physicians & American Pain Society ¹	Heat at home, manipulation for patients without progress
† CLIP – Canadian ²²	Manipulation
‡ Official Disability Guideline for Workers Compensation -American ²⁵	Manipulation & exercise for patients without progress.
Pain lasting < 6 weeks (Education *)	
† Dutch Physiotherapy ¹⁷	Home exercise program
† Dutch Manual Therapy ¹⁸	Manipulation and exercise
† European ⁵	Manipulation for patients without progress
‡ American College of Occupational & Environmental Medicine ²¹	Aerobic Exercise, Fear Avoidance Behaviour training, manipulation for patients meeting CPR
† Institute for Clinical Systems Improvement – American ²³	Exercise & manipulation if not better in 2 weeks; home ice/heat
‡ Chiropractic – American ²⁴	Manipulation, manipulation together with exercise
‡ CKS ²⁶ & NICE ²⁷ – Great Britain	If patient not progressing in 2 weeks follow sub-acute pain
Pain lasting <12 weeks (Education *)	
‡ Norwegian ¹⁶	Manipulation if not better in 2 weeks; exercise after 4 or 6 weeks
† Australian ³	Wrapped heat at home
† New Zealand ¹⁹	Manipulation first 4 or 6 weeks; multidisciplinary rehab when barriers to return to work are identified

CKS=Clinical Knowledge Summaries; CLIP=Clinic on Low Back Pain Interdisciplinary Practice; CPR=clinical prediction rules; FBA=fear avoidance behavior; NICE=National Institute of Health and Clinical Excellence; *Education (all guides): stay active, avoid bed rest, and reassure that pain is benign, return to work as soon as possible; †Guideline evaluated and with good methodology; ‡Guideline not evaluated for quality.

The most common recommendation from these sixteen guidelines was patient education. After patient education, spine manipulation^{1,4,5,16,18,19,21-25,27} and exercise^{16-18,21,23-25,27} were the most common therapeutic intervention recommended for patients with non-specific acute LBP. However, these guidelines did not provide specific recommendations for criteria to select patients for exercises or spine manipulation as well as criteria to select type of exercise to be used for intervention. The exception of this lack of specificity was the guidelines from the American College of Occupational and Environmental Medicine (ACOEM)²¹ that

recommended the use of clinical prediction rules¹³ to select patients with non-specific LBP to be treated with spinal manipulation. This latter recommendation was based on physical therapy practice and research findings¹³.

Only six guidelines provided recommendations for patients with acute LBP and radiculopathy, Table 4. The most common recommendation for patients with acute LBP and radiculopathy was education. These guidelines indicated that LBP with radiculopathy take longer to recover than non-specific low back pain, up to four or six weeks to improve after the initial onset

Table 4. Evidence based practice guidelines intervention for acute and subacute low back pain with radiculopathy.

Guideline	Acute: Education*	Sub-acute: Education*
	Pain lasting < 4 wks	Pain lasting 4 to 12 wks
†Italian ⁴	Bed rest acceptable for 2-4 days; no manipulation	Low impact aerobic activity; stenosis: avoid long walks, use a bike; discogenic: control posture, reduce/modify work activity
†Clinic on Low Back Pain Interdisciplinary Practice ²² – Canadian	Extension exercises for disc herniation	McKenzie approach; multidisciplinary rehabilitation
†Institute for Clinical Systems Improvement – American ²³	No manipulation with symptom peripheralization	No subacute classification
Official Disability Guidelines for Workers Comp – American ²⁵	No manipulation; avoid strenuous work; back school if not making progress in 3 or 4 weeks	Back school
	Pain lasting < 6 weeks	Pain lasting 6 to 12 weeks
‡Chiropractic – American ²⁴	§Manipulation, exercise	Not addressed
‡Clinical Knowledge Summaries ²⁸ – Great Britain	Avoid bed rest; pain may take 6 - 12 weeks to subside; refer to physiotherapy if not progressing	Refer to physiotherapy if not progressing
	Pain lasting <12 weeks	Sub-acute not defined
‡Norwegian ¹⁶	Bed rest may be necessary	

* Education (all guides): stay active, return to work gradually and as soon as possible, educate that back pain with radiculopathy may take longer to recover than non-specific back pain; †Guideline evaluated and with good methodology; ‡Guideline not evaluated for quality; §Level of research evidence quality C or fair.

of symptoms. The second most common recommendation for patients with radiculopathy was that spine manipulation was contraindicated for patients with radiculopathy^{4,22,23}, with one exception. The American guideline for chiropractic back care²⁴ recommended the use of manipulation to treat patients with radiculopathy (Table 4).

Two^{22,24} out of six guidelines recommended exercise for management of acute radiculopathy. The Clinic in Low Back Pain Interdisciplinary Practice (CLIP)²² guideline made specific recommendation for extension exercises to manage patients with disc herniation. The Official Disability Guideline for Workers²⁵ recommended back school for patients with radiculopathy after three weeks of the initial onset of symptoms when the patient was not making progress. No guideline contradicted the use of exercise or back school in the management of acute radiculopathy.

Interventions for Sub-acute Low Back Pain

The definitions of sub-acute LBP varied (Tables 4 and 5). Four guidelines^{1,4,22,25} defined sub-acute LBP as pain lasting from 4 to 12 weeks. Eight guidelines defined sub-acute LBP as pain lasting from 6 to 12 weeks^{5,17,18,20,21,24,27,28}. Four guidelines^{3,16,19,23} did not separate acute from sub-acute LBP for management purposes. Eleven guidelines^{1,4,5,17,18,21,22,24,25,27,28} addressed the management of non-specific sub-acute LBP with conservative interventions (Table 5).

Eleven guidelines^{1,4,5,17,18,20-22,24,25,27,28} addressed the intervention of non-specific sub-acute LBP with education and exercise. From eleven guidelines, five recommended the use of manipulation for patients with non-specific sub-acute LBP,

four recommended multidisciplinary teamwork, and three recommended back school. The Italian guideline⁴ for LBP contraindicated spine manipulation and recommended aerobic exercises and avoidance of end-range of motion exercises for patients with sub-acute symptoms who had lumbar instability (diagnosed with radiography).

Three guidelines addressed the conservative intervention of sub-acute LBP with radiculopathy^{4,22,25}. The most common recommendation from these latter guidelines was patient education (Table 4). Besides education, there was not a consensus for intervention of patients with sub-acute LBP and radiculopathy. The Italian guideline⁴ separated LBP with radiculopathy into discogenic and stenotic for intervention purposes; it recommended low impact aerobic activity for both discogenic and stenotic diagnoses and offered different exercise/activity options for each of these diagnoses (Table 4). The CLIP guideline²² recommended the McKenzie exercise approach when prescribing exercises for patients with sub-acute LBP and radiculopathy. The Clinical Knowledge Summaries (CKS)²⁸ guideline recommended that patients with LBP and radiculopathy without progress be referred for physical therapy, this guideline entrusted the care of patients with radiculopathy without progress to physical therapists as clinical specialists. The Official Disability Guideline for Workers²⁵ recommended back school for patients with sub-acute LBP and radiculopathy similarly to the management of patients with acute LBP and radiculopathy.

Interventions for chronic low back pain

Nine guidelines addressed interventions for chronic non-specific LBP (Table 6). One practice guideline²³

Table 5. Evidence based practice guidelines intervention for non-specific sub-acute low back pain.

Guideline	Pain > 4 weeks < 12 weeks
†Italian ⁴	Aerobic activity, behavioral counseling; for instability, avoid end-range exercise and end-range activity, no manipulation
†American College of Physicians & American Pain Society ¹	Exercise, manipulation, multidisciplinary rehab, behavioral counseling
†CLIP – Canadian ²²	Exercises, Multidisciplinary rehab
‡ Official Disability Guideline for Workers Compensation –American ²⁵	Active rehabilitation (exercise, avoid physical agents)
Guideline	Pain > 6 weeks < 12 weeks
† Dutch Physiotherapy ¹⁷	Same as acute, address yellow flags for chronic pain
† Dutch Manual Therapy ¹⁸	Same as acute, address yellow flags for chronic pain
† European ⁵	Multidisciplinary intervention for patients out of work; exercise, manipulation
‡ American College of Occupational & Environmental Medicine ²¹	Aerobic Exercise, *FAB training
† Institute for Clinical Systems Improvement – American ²³	No subacute classification
‡ Chiropractic – American ²⁴	Manipulation, graded exercises in work settings
‡ CKS ²⁶ & NICE ²⁷ – Great Britain	Manipulation, acupuncture, exercise; behavioral counseling if above fails

CKS=Clinical Knowledge Summaries; CLIP=Clinic on Low Back Pain Interdisciplinary Practice; FBA=fear avoidance behavior, NICE=National Institute of Health and Clinical Excellence; *Education (all guides): stay active, avoid bed rest, reassure that pain is benign, and return to work as soon as possible; †Guideline evaluated and with good methodology; ‡Guideline not evaluated for quality.

Table 6. Evidence based practice guidelines intervention for chronic low back pain.

Guideline	Non-Specific: Education*	Radiculopathy: Education*
Pain > 6 weeks		
†Institute for Clinical Systems Improvement ²³ – American	Short course of Manipulation & Exercises (core stability training, graded program, intensive training); postural education; address yellow flags; multidisciplinary rehab	Try conservative therapy before referring to a surgeon. No physical therapy intervention discussed for radiculopathy
Pain > 12 weeks		
†Italian ⁴	Exercises (individual & specific), instability (Table 5), ADL & Work modification, behavioral therapy, back school, multidisciplinary rehab	Aerobic activity (Table 6); behavioral therapy, back school, multidisciplinary rehab
†American College of Physicians & American Pain Society ¹	Exercise, manipulation, behavioral counseling, multidisciplinary rehab	Not addressed
†CLIP – Canadian ²²	Exercises, behavioral therapy, multidisciplinary rehab, back school	Not addressed
†Dutch Physiotherapy ¹⁷	Exercise Therapy (including exercise in water), behavioral therapy	Not addressed
†Dutch Manual Therapy ¹⁸	Exercise therapy based on behavioral principles, manipulation	Not addressed
†European ¹	Supervised exercise, behavioral therapy. Short course of manipulation and back school	Not addressed
‡American College of Occupational & Environmental Medicine ²¹	Aerobic exercises, FAB training, back school, behavioral counseling	Same as simple LBP, no intervention specific for radiculopathy
‡Chiropractic – American ²⁴	Manipulation, exercise therapy	Not addressed

CLIP=Clinic on Low Back Pain Interdisciplinary Practice; FAB=fear avoidance behavior. * Education = stay active, no bed rest; †Guideline evaluated and with good methodology; ‡Guideline not evaluated for quality.

defined chronic LBP as pain lasting six weeks or more and eight guidelines^{1,4,17,18,20-22,24} defined LBP as pain lasting twelve weeks or more. All guidelines recommended patient education and exercise for the management of chronic non-specific LBP. There was a consensus for education, but not for the type of exercise recommended for non-specific chronic LBP. All guidelines recommended some type of exercise (core stability, individualized program, graded progressively, aquatic therapy,

exercise based on behavioral principles, under supervision) that required a clinical specialist for prescription. The Italian guideline⁴ recommended patients with chronic LBP and signs/symptoms of vertebral instability to be managed like patients with instability as described in sub-acute LBP. The ACOEM guideline²¹ recommended the use of FAB training and the Dutch guideline for Manual Therapy¹⁸ recommended the use of behavioral principles when prescribing exercises for patients with

chronic non-specific LBP. The recommendation about exercise based on behavioral principles was based on physical therapy practice and research findings^{17,29}.

Six guidelines^{1,4,17,20-22} recommended behavioral counseling or therapy for chronic non-specific LBP (Table 6). Four guidelines recommended multidisciplinary rehabilitation^{1,4,22,23} and/or back school^{4,20-22} for chronic non-specific LBP. Four guidelines recommended spine manipulation^{1,18,20,24} for management of chronic non-specific LBP. No guideline contraindicated spine manipulation as an intervention of chronic non-specific LBP.

Three guidelines^{4,21,23} addressed the intervention of chronic LBP and radiculopathy with conservative procedures (Table 6). The recommendations for chronic LBP with radiculopathy were also inconsistent among guidelines. The Italian guidelines⁴ separated patients with disc herniation from stenosis to recommend different types of aerobic activity just like for sub-acute LBP as described above; it also recommended behavioral therapy, multidisciplinary rehabilitation, and back school for patients with radiculopathy. The Institute for Clinical System Improvement (ICSI)²³ recommended that patients with chronic radiculopathy be managed conservatively first before referral for a surgeon is considered. However, The ICSI guide did not specify what type of conservative intervention should be used in patients with chronic LBP and radiculopathy. The ACOEM guideline²¹ did not separate patients with non-specific LBP from those with LBP and radiculopathy for conservative intervention.

Discussion ...

Sixteen guidelines^{1,3-5,16-25,27,28} met our inclusion criteria. Ten^{1,3-5,17-20,22,23} of these sixteen guidelines were previously evaluated and had good methodological quality¹¹. From the six remaining guidelines not previously evaluated, two^{27,28} were not evaluated because they were very recently published, two^{21,25} were not evaluated because they included patients with LBP in occupational settings, one¹⁶ because it did not have an English version when it was first published, and another²⁴ guideline for unknown reasons. From the guidelines that were not evaluated, three were European^{16,27,28} and three were American^{21,24,25}. All European guidelines not previously evaluated, one Norwegian¹⁶ and two British^{27,28}, had similar recommendations (Tables 3-6) to other European^{5,20} guidelines with good methodology. From the three American guidelines not previously evaluated^{21,24,25}, the guideline for chiropractic care of LBP had contradicting recommendation for intervention of LBP with radiculopathy, see below. The recommendations for specialist referral were similar from the ten guidelines^{1,3-5,17-20,22,23} previously evaluated

and the six guidelines^{16,21,24,25,27,28} that had not been previously evaluated.

Many guidelines made specific recommendations for specialist referral. Patients presenting with cauda equina syndrome and abdominal aortic aneurysm required immediate referral and possibly emergency care⁴. Patients with high fever ($>38^{\circ}\text{C}$ or 100.4°F) lasting longer than 48 hours, progressive neurological signs and symptoms (i.e.; paresis to paralysis, peripheralization of pain), or unrelenting night pain not relieved by postural changes required urgent consultation within 24 hours²³. A single red flag (e.g.; age over 50) was not enough to indicate specialist referral, but a patient presenting with a cluster of red flags (e.g.; age over 50, non-mechanical pain, thoracic spine pain) should definitely be referred for medical consultation²⁸. These guidelines give physical therapists the confidence to manage patients with LBP without red flags in direct access without medical referral.

The majority of patients seeking care for LBP do not have a specific pathology or disease responsible for their symptoms, 85% to 95% of patients with low back pain do not have red flags^{1,5} and therefore not requiring physician specialist referral (Table 1). Approximately 2% or less of patients with back pain may have visceral diseases (gastrointestinal or genitourinary)³⁰. Only 1% or less has a neoplasm^{1,5}. The chances for someone to have back pain associated with infection, ankylosing spondylitis, or abdominal aortic aneurysm is even smaller than 1%⁵. About 3-4% of patients with back pain may present with a spinal fracture⁵. One hundred percent of patients with cancer may be screened out based on a history of cancer (positive likelihood ratio= 14.7), unexplained weight loss (positive likelihood ratio= 2.7), failure to improve after 1 month (positive likelihood ratio= 3.0), and age older than 50 years (positive likelihood ratio= 2.7)¹. Urinary retention has 90% sensitivity to rule out patients with cauda equina compromise, 1/10000 patients without urinary retention may have cauda equina syndrome¹. Patients with compression fractures may best be screened out with age (>50 years old sensitivity 0.84, specificity 0.61, positive likelihood 2.20, negative likelihood 0.26; >70 years old sensitivity 0.22, specificity 0.96, positive likelihood 5.5, negative likelihood 0.88)³⁰. Osteomyelitis may best be rule out with spinal tenderness to percussion (0.86 sensitivity, specificity 0.61, positive likelihood 2.1, negative likelihood 0.23)³⁰. These likelihood ratios help physical therapists to make referrals grounded on clinical evidence. Physical therapists may safely manage patients without red flags (with or without radiculopathy) in any stage of LBP (acute, sub-acute, or chronic), but should refer patients without clinical progress for physician specialists or psychologists particularly in the sub-acute and chronic phase of LBP^{1,5,22,23}.

As noted in a recent evaluation of clinical practice guidelines for LBP³¹, the majority of the guidelines published over

the last eight years addressed the most important conservative interventions for acute (sixteen out of sixteen) and sub-acute (eleven out of sixteen) non-specific LBP (Tables 4 and 6). The number of guidelines addressing chronic LBP (nine out of sixteen) was a little over half of that for acute LBP. The intervention choices for non-specific LBP were similar in the majority of the guidelines (Tables 4) for acute (education, exercises, and spine manipulation), sub-acute (same as acute plus back school, behavioral counseling, or multidisciplinary rehabilitation), and chronic LBP (education and exercise plus back school, behavioral counseling, or multidisciplinary rehabilitation). However, no more than six guidelines addressed the conservative intervention of acute LBP with radiculopathy and only three guidelines addressed the conservative intervention of sub-acute and chronic LBP with radiculopathy.

There was an overwhelming consensus to use education to manage acute, sub-acute, and chronic back pain, whether the patient had radiculopathy or not, (Tables 4 to 6). The goal to educate the patient in the acute and sub-acute stages of LBP was to keep the patient active and to inform the patient that non-specific LBP has a benign natural course to prevent the symptoms to become chronic. The education for LBP with radiculopathy was similar to non-specific LBP, the main difference was that the patient would be forewarned that his/her symptoms could take up to six weeks to get better, but overall, LBP with radiculopathy is also a condition that naturally improves without invasive interventions. The purpose of education in the sub-acute and chronic phase of LBP was to keep the patient active and functional; it was also very important to address any yellow flags (Table 2) that could be preventing the patient to have a full functional recovery^{1,5,17,19,20,23}.

There was a consensus to use exercise for the management of patients with non-specific acute, sub-acute, and chronic LBP. Fifty percent of the guidelines recommended exercise for acute (Table 4) and 100% recommended exercise to manage sub-acute (Table 4) and chronic non-specific LBP (Table 6). There was an overwhelming consensus to use exercise for non-specific sub-acute and chronic LBP; however, there was not a consensus for the type of exercise to be used. In general, the guidelines recommended exercises for non-specific acute, sub-acute, and chronic LBP to keep the patient active and improve or maintain flexibility, muscle strength, and aerobic endurance. These guidelines generally emphasized an exercise program to prevent functional decline without exacerbating patient's symptoms rather than a proactive exercise approach designed to speed up functional recovery¹⁵. Few guidelines discussed or recommended exercise for acute, sub-acute, or chronic LBP with radiculopathy (Table 5). Two guidelines recommended exercises for patients with acute^{22,24} and sub-acute^{4,22} radiculopathy and only one guideline recommended

exercise for chronic radiculopathy⁴. The guidelines did not have a consensus for the type of exercise to recommend for patients with LBP and radiculopathy.

There was a consensus for the indication of spine manipulation for non-specific acute (75%) and subacute LBP (50%); while only 45% of the guidelines recommended manipulation for non-specific chronic LBP. There was a consensus (86%) not to recommend spine manipulation for patients with LBP and radiculopathy and three guidelines^{4,22,23} even contraindicated the use of spine manipulation for patients with radiculopathy. The exception to this was the Chiropractic Guideline²⁴ for LBP that recommended spine manipulation for acute LBP with radiculopathy. However, the chiropractic guideline for LBP was mono-disciplinary and based on a consensus from chiropractor experts²⁴. The chiropractic guideline could have allowed the self-interest of the profession bias the recommendation in favor of spine manipulation disregarding a systematic analysis of the literature³².

After education, exercise, and spine manipulation; the most common conservative interventions for patients with LBP were multidisciplinary rehabilitation, back school, and behavioral counseling. These interventions were recommended for patients with non-specific sub-acute (80%) and chronic LBP (77%) as well as patients with sub-acute and chronic LBP with radiculopathy (100%). The overall purpose of these interventions were to address yellow flags that may hinder functional recovery, to teach coping strategies to assist the patient to deal better with his/her symptoms, to provide further education on back pain epidemiology and prevention, and to offer vocational training to reintroduce the patient to his/her job or to assist the patient to transition to a new job. The New Zealand guidelines¹⁹ and the Dutch guidelines^{17,18} made specific recommendations on how to handle motivational problems to improve patient prognosis, these recommendations could be useful in physical therapy practice in conjunction with exercise and spine manipulation to manage patients particularly in the sub-acute and chronic phases of LBP.

The majority of guidelines did not offer explicit recommendations for the use of spine manipulation to treat non-specific LBP (instability or hypermobility versus hypomobility)³³. This majority also did not make clear exercise recommendations for LBP with or without radiculopathy (stabilization or directional preference)^{15,31}. The guidelines triaged LBP without red flags into two groups of patients for conservative intervention: either non-specific LBP or LBP with radiculopathy. This triage system dates back from 1994 when the Agency for Health Care Policy and Research published the first clinical practice guideline for LBP in the United States³⁴. While this broad triage of patients may be useful in primary care to screen patients to refer to physician specialists and imaging tests, this triage may

be becoming outdated to guide conservative intervention of patients without red flags^{15,33,35}. The current and newer system of LBP classification for conservative intervention of LBP recognizes more than two groups of patients with non-specific LBP (manipulation group with joint hypomobility and stability group with lumbar instability) and at least four groups of patients with LBP and radiculopathy (specific exercise groups with extension, flexion, or lateral shift preference; or traction)³⁶. LBP intervention based this newer classification system of LBP have been shown to give better outcome results than LBP treatment based on EBP practice guidelines^{15,33,35}.

In the last five years, a few clinical practice guidelines have started to recognize the new classification system of LBP to recommend conservative intervention³³. The ACOEM guidelines²¹ recognized clinical prediction rules¹³ to select patients from the non-specific LBP triage to recommend spine manipulation (manipulation group for patients with hypomobility). The CLIP guideline²² recognized the McKenzie approach for LBP endorsing exercises based on flexion, extension, and lateral shift preference for patients with radiculopathy. The Italian guideline⁴ recognized that LBP without radiculopathy could be divided into a lumbar instability group and a non-specific group, and that LBP with radiculopathy could be divided into a disc herniation (extension preference) group and a spinal stenosis group (flexion preference) for conservative intervention. Following this recent five-year trend to utilize the new system of LBP classification to recommend conservative care, it is likely that the updates or new editions of LBP guidelines would start to recognize this new system of LBP classification to recommend conservative intervention.

The reason why the recommendations for exercise and spine manipulation in the majority of the guidelines were so general may be because they were multidisciplinary with a primary care focus often deviating from routine specialist care³². Mono-disciplinary guidelines tend to be more detailed and

more clinically relevant for professionals from the same discipline³². There was a gap in the literature for mono-disciplinary physical therapy guidelines with a focus on conservative care of LBP. However, to retain a balance between evidence and professional relevance, these mono-disciplinary guidelines need be an offspring of or be peer-reviewed by a parent multi-disciplinary guideline³², similar to the guidelines from the American College of Radiology³⁷ being an offspring of the American College of Medicine¹.

Conclusion ::::

There is a need for new mono-disciplinary guidelines addressing the physical therapy management of LBP. These guidelines could be based on the International Classification of Functioning of the World Health Organization following the examples of guidelines recently published for neck and heel pain^{38,39}. Physical therapy guidelines could also be based on the new system of LBP classification³⁶; non-specific LBP subdivided into stabilization and manipulation groups and LBP with radiculopathy divided in directional preference and traction groups. One sub-classification of patients that should be added to the latter system of LBP classification is the group of patients that responds to exercise based on behavioral principles as described in recent LBP practice guidelines^{17,18,21} and recent physical therapy literature^{40,41}. This would be the group of patients with LBP and yellow flags^{17,18} or high Fear Avoidance Behaviour (FBA) scores²¹. This latter group of patients responds best to an exercise approach (graded exposure or graded exercise) based on behavioral principles. Future mono-disciplinary practice guidelines for conservative care of LBP would not only improve physical therapist adherence to guidelines, but it would also reduce fragmentation in care by achieving consistency across professions and delivering common messages.

References ::::

1. Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle P, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med.* 2007;147(7):478-91.
2. Philadelphia Panel. Philadelphia Panel evidence-based clinical practice guidelines on selected rehabilitation interventions for low back pain. *Phys Ther.* 2001;81(10):1641-74.
3. Australian Acute Musculoskeletal Pain Guidelines Group. Evidence based management of acute pain. *Acute low back pain.* 2003.
4. Negrini S, Giovannoni S, Minozzi S, Barneschi G, Bonaiuti D, Bussotti A, et al. Diagnostic therapeutic flow-charts for low back pain patients: the Italian clinical guidelines. *Eura Medicophys.* 2006;42(2):151-70.
5. van Tulder M, Becker A, Bekkering T, Breen A, del Real MT, Hutchinson A, et al. Chapter 3. European guidelines for the management of acute nonspecific low back pain in primary care. *Eur Spine J.* 2006;15 Suppl 2:S169-91.
6. Pai S, Sundaram LJ. Low back pain: An economic assessment in the United States. *Orthop Clin North Am.* 2004;35(1):1-5
7. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WJ. Evidence based medicine: What it is and what it isn't. *BMJ.* 1996;312(7023):71-2.
8. Ritter B. Considering evidence-based practice. *Nurse Pract.* 2001;26(5):63-5.
9. Appraisal of Guidelines for Research & Evaluation (AGREE) Instrument. The agree collaboration. Appraisal of guidelines for research & evaluation (agree) instrument. 2001;2006.

10. van Tulder MW, Tuut M, Pennick V, Bombardier C, Assendelft WJ. Quality of primary care guidelines for acute low back pain. *Spine (Phila Pa 1976)*. 2004;29(17):E357-62.
11. Bouwmeester W, van Enst A, van Tulder M. Quality of low back pain guidelines improved. *Spine (Phila Pa 1976)*. 2009;34(23):2562-7.
12. Shekelle P, Eccles MP, Grimshaw JM, Woolf SH. When should clinical guidelines be updated? *BMJ*. 2001;323(7305):155-7.
13. Childs JD, Fritz JM, Flynn TW, Irrgang JJ, Johnson KK, Majkowski GR, et al. A clinical prediction rule to identify patients with low back pain most likely to benefit from spinal manipulation: A validation study. *Ann Intern Med*. 2004;141(12):920-8.
14. Clare HA, Adams R, Maher CG. A systematic review of efficacy of McKenzie therapy for spinal pain. *Aust J Physiother*. 2004;50(4):209-16.
15. Fritz JM, Delitto A, Erhard RE. Comparison of classification-based physical therapy with therapy based on clinical practice guidelines for patients with acute low back pain: A randomized clinical trial. *Spine (Phila Pa 1976)*. 2003;28(13):1363-71; discussion 1372.
16. The Norwegian Back Pain Network -The communication unit. Acute low back pain. Interdisciplinary clinical guidelines Oslo; 2002.
17. Bekkering GE, Hendriks HJM, Koes BW, Oostendorp RAB, Ostelo RWJG, Thomassen JMC, et al. Dutch physiotherapy guidelines for low back pain. *Physiotherapy*. 2003;89(2):82-96.
18. Heijmans WFGJ, Hendriks HJM, van der Esch M, Pool-Goudzwaard A, Scholten-Peeters GGM, van Tulder MW, et al. Kngf-guideline manual therapy on low back pain; 2003.
19. New Zealand Guidelines Group. New zealand low back pain guide; 2004.
20. Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klüber-Moffett J, Kovacs F, et al. Chapter 4. European guidelines for the management of chronic nonspecific low back pain. *Eur Spine J*. 2006;15 Suppl 2:S192-300.
21. Hagmann KT. Low back disorders. Occupational medicine practice guidelines: Evaluation and management of common health problems and functional recovery in workers. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2007.
22. Poitras S, Rossignol M, Dionne C, Tousignant M, Truchon M, Arsenault B, et al. An interdisciplinary clinical practice model for the management of low-back pain in primary care: The CLIP project. *BMC Musculoskelet Disord*. 2008;9:54.
23. Thorson DC, Jorgenson-Rathke J, Hecht S, Campbell R, Buttermann G, Kramer C, et al. Adult low back pain. Clinical practice guidelines. 2008.
24. Globe GA, Morris CE, Whalen WM, Farabaugh RJ, Hawk C; Council on Chiropractic Guidelines and Practice Parameter. Chiropractic management of low back disorders: Report from a consensus process. *J Manipulative Physiol Ther*. 2008;31(9):651-8.
25. Work Loss Data Institute. Low back - lumbar & thoracic (acute & chronic) Corpus Christi (TX): Work Loss Data Institute; 2008.
26. American Osteopathic Association. American osteopathic association guidelines for osteopathic manipulative treatment (omt) for patients with low back pain. 2009.
27. Savigny P, Kuntze S, Watson P, Underwood M, Ritchie G, Cotterell M, et al. Low back pain: Early management of persistent non-specific low back pain guidelines. 2009.
28. CKS. Back pain - low with and without radiculopathy. Clinical knowledge summaries. 2009.
29. Kernan T, Rainville J. Observed outcomes associated with a quota-based exercise approach on measures of kinesiophobia in patients with chronic low back pain. *J Orthop Sports Phys Ther*. 2007;37(11):679-87.
30. Jarvik JG, Deyo RA. Diagnostic evaluation of low back pain with emphasis on imaging. *Ann Intern Med*. 2002;137(7):586-97.
31. Arnau JM, Vallano A, Lopez A, Pellise F, Delgado MJ, Prat N. A critical review of guidelines for low back pain treatment. *Eur Spine J*. 2006;15(5):543-53.
32. Breen AC, van Tulder MW, Koes BW, Jensen I, Reardon R, Bronfort G. Mono-disciplinary or multidisciplinary back pain guidelines? How can we achieve a common message in primary care? *Eur Spine J*. 2006;15(5):641-7.
33. Brennan GP, Fritz JM, Hunter SJ, Thackeray A, Delitto A, Erhard RE. Identifying subgroups of patients with acute/subacute "Nonspecific" low back pain: Results of a randomized clinical trial. *Spine (Phila Pa 1976)*. 2006;31(6):623-31.
34. Bigos SJ, Bowyer ROR, Braen GR, Brown K, Deyo R, Scott H, et al. Acute low back problems in adults. Clinical practice guideline. 1994;14.
35. Hall H, McIntosh G, Boyle C. Effectiveness of a low back pain classification system. *Spine J*. 2009;9(8):648-57.
36. Childs MJD, Fritz JM, Cleland JA. Subgrouping patients with low back pain: Evolution of a classification approach to physical therapy. *J Orthop Sports Phys Ther*. 2007;37(6):290-302.
37. Davis PC, Wippold FJ, Brunberg JA, Cornelius RS, De LA Paz RL, Dormont D, et al. ACR appropriateness Criteria® low back pain. Reston (VA): American College of Radiology (ACR); 2008.
38. Childs JD, Cleland JA, Elliott JM, Teyhen DS, Wainner RS, Whitman JM, et al. Neck pain: Clinical practice guidelines linked to the international classification of functioning, disability, and health from the orthopedic section of the American Physical Therapy Association. *J Orthop Sports Phys Ther*. 2008;38(9):A1-A34.
39. McPoil TG, Martin RL, Cornwall MW, Wukich DK, Irrgang JJ, Godges JJ. Heel pain--plantar fasciitis: Clinical practice guidelines linked to the international classification of function, disability, and health from the orthopaedic section of the American Physical Therapy Association. *J Orthop Sports Phys Ther*. 2008;38(4):A1-A18.
40. George SZ, Zeppleri G. Physical therapy utilization of graded exposure for patients with low back pain. *J Orthop Sports Phys Ther*. 2009;39(7):496-505.
41. de Jong JR, Vlaeyen JW, Onghena P, Goossens ME, Geilen M, Mulder H. Fear of movement/(re) injury in chronic low back pain: Education or exposure in vivo as mediator to fear reduction? *Clin J Pain*. 2005;21(1):9-17; discussion 69-72.