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GUIDELINES

Management of low back pain and lumbosacral radicular syndrome: the Guideline of the Royal Dutch Society for Physical Therapy (KNGF)

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ABSTRACT

BACKGROUND: Significant progress and new insights have been gained since the Dutch Physical Therapy guideline on low back pain (LBP) in 2013 and the Cesar en Mensendieck guideline in 2009, necessitating an update of these guidelines.
AIM: To update and develop an evidence-based guideline for the comprehensive management of LBP and lumbosacral radicular syndrome (LRS) without serious specific conditions (red flags) for Dutch physical therapists and Cesar and Mensendieck Therapists.
DESIGN: Clinical practice guideline.
SETTING: Inpatient and outpatient.
POPULATION: Adults with LBP and/or LRS.
METHODS: Clinically relevant questions were identified based on perceived barriers in current practice of physical therapy. All clinical questions were answered using published guidelines, systematic reviews, narrative reviews or systematic reviews performed by the project group. Recommendations were formulated based on evidence and additional considerations, as described in the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Evidence-to-Decision framework. Patients participated in every phase.
RESULTS: The guideline describes a comprehensive assessment based on the International Classification of Functioning, Disability and Health (ICF) Core Set for LBP and LRS, including the identification of alarm symptoms and red flags. Patients are assigned to three treatment profiles (low, moderate and high risk of persistent symptoms) based on prognostic factors for persistent LBP. The guideline recommends offering simple and less intensive support to people who are likely to recover quickly (low-risk profile) and more complex and intensive support to people with a moderate or high risk of persistent complaints. Criteria for initiating and discontinuing physical therapy, and referral to a general practitioner are specified. Recommendations are formulated for information and advice, measurement instruments, active and passive interventions and behavior-oriented treatment.
CONCLUSIONS: An evidence based physical therapy guideline for the management of patients with LBP and LRS without red flags for physical therapists and Cesar and Mensendieck therapists was developed. Cornerstones of physical therapy assessment and treatment are risk stratification, shared decision-making, information and advice, and exercises.
CLINICAL REHABILITATION IMPACT: This guideline provides guidance for clinicians and patients to optimize treatment outcomes in patients with LBP and LRS and offers transparency for other healthcare providers and stakeholders.

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KEY WORDS: Practice guideline; Physical therapy; Low back pain; Radiculopathy.

Low back pain (LBP) is the most common musculoskeletal problem with potential significant suffering, activity limitation and absenteeism from work. LBP has high socioeconomic impact and has been identified as the leading cause of years lived with disability globally.[1, 2] In Dutch primary healthcare patients with LBP make up an important part of the total number of patients. On a total population of more than 17 million people, slightly fewer than 900,000 new cases of LBP visited the general practitioner in 2017.[3] The actual number of new cases is higher because some people visit another healthcare provider or do not seek care. In 2019, Dutch physical therapists in primary care labelled at least 10.3% of their patients as having LBP. Exact numbers are not available as Dutch physical therapists register LBP by different codes.

Most people with LBP have no severe limitations. However, the high prevalence of LBP in combination with a high degree of limitations in a small minority of the cases causes a very large societal impact.[4] The Dutch National Institute for Public Health and the Environment reports that the medical costs in the Netherlands for neck and back complaints amounted to € 937 million in 2017.[3] This equates to 14% of the total healthcare costs incurred in that year for musculoskeletal system and connective tissue disorders and 1.07% of the total costs of healthcare in the Netherlands. Of the costs for neck and back complaints, 62% was spent on hospital care, 12% on primary care and 11% on other providers. Compared to 2017, the medical costs in the Netherlands for neck and back complaints were higher in 2011 (€ 1.3 billion) and percentage-wise there were lower costs for hospital care (38%) and higher costs for primary care (29%).[3]

Many of the mechanisms that are at the root of LBP are still not very well understood, and the extent of recovery from the complaints is difficult to predict.[4, 5] Valid methods for pointing to specific structures as the source of the pain are lacking, and an underlying pathology cannot be demonstrated in approximately 90% of people with LBP.[6, 7] Therefore, LBP is currently deemed to be a multidimensional experience with somatosensory, affective and cognitive components. In addition to disrupted pain processes and biomechanical disruptions, lifestyle, comorbidity, psychological, social and genetic factors can play a role.[8, 9]

An episode of LBP can start slowly or acutely due to physical factors (*e.g.* due to lifting an object or making an (un)usual movement), psychosocial factors (*e.g.*, fatigue or stress) or a combination of these two (*e.g.* being distracted when lifting).[10] The percentage of people with an acute onset of LBP is estimated to be 17% to 59%.[11, 12] Approximately 30% of people cannot remember a cause.[13] During the first four to six weeks most people recover and pain and physical functioning improve by an average of 25-60%.[14, 15] After a month 20% to 40% of people have recovered completely and after three months 33-74%.[16-19] The recovery flattens out after three months. The percentage of people who recover completely after three to 12 months is estimated to be 35% and 75%.[16, 17, 19] After 12 months, the people who still have complaints remains more or less stable.[20, 21]

Relapses of LBP occur frequently. One to two in three people have a chance of relapsing within one year of recovery from a previous episode.[22-24] Therefore, for many people, LBP is a dynamic condition whereby episodes of little to no LBP alternate with episodes of moderate to severe LBP.[4, 25]

The numbers regarding resumption of work are more favorable than those for pain and physical functioning. Resumption of work after one, three, six and 12 months is estimated to be 63% to 82%, 80% to 95%, 84% to 98% and 89% to 98%, respectively.[15, 17, 26, 27]

Radicular pain occurs when there is nerve-root involvement. The typical clinical picture of a lumbosacral radicular syndrome (LRS) is severe, sharp, shooting pain. The pain is felt in the buttocks and/or leg and accompanied by one or more complaints or symptoms suggestive of a condition of a specific lumbosacral nerve root, such as tingling sensations (paresthesia) and neurological loss of function (hypoesthesia/hypoalgesia, paresis, diminished reflexes) localized to the territory of the affected nerve root.[28] Roots L5 or S1 are injured in most cases, therefore the pain usually radiates out to under the knee. In a large number of cases, the radicular pain is dominant over the LBP, and a number of patients only experience pain in the leg. The pain can get worse during moments of increased pressure and generally abates when lying down.[28, 29] In most cases, LRS is caused by a lumbar hernia.[28] The diagnosis of a LRS can be challenging, because a gold standard for determining LRS is lacking, and in about one-third of patients with an LRS diagnosis, no root compression can be seen on the MRI scan.[30] Besides LRS can coexist with referred pain. Referred pain is pain felt in a part of the body other than the part with the original injury. Radiculopathy is not a pain condition, but a loss of nerve function like weakness, loss of sensation, or loss of reflexes caused by an injury to the nerve root. The prevalence of adults that suffer from a LRS is considerably lower than the prevalence of LBP. The one-year prevalence is estimated to be 1% to 5% and

the life-time prevalence 13% to 40%.[31] In 2015 a one-year prevalence of 1.7% was found at Dutch general practices.[32] The short-term and long-term prognosis for LBP with neuropathic pain radiating into the lower limbs is probably slightly less favorable than for LBP without LRS.[33-36] For patients with LRS, the recovery percentage after one year is estimated to be between 44% and 65%.[34, 36-39]

Primary care physical therapists and exercise therapists are key disciplines in the conservative management of LBP but also for LRS without alarm symptoms (*i.e.* symptoms that raise the concern that a patient may have a severe illness and requires careful evaluation). Clinical practice guidelines can assist these practitioners choosing the right therapeutic intervention(s) for the right goals, at the right place within the healthcare process, and to decrease practical variations.

Aim

Since the publication of the Royal Dutch Society for Physical Therapy (KNGF) guideline on LBP in 2013 with an update of the clinimetrics in 2017[40] and the Cesar en Mensendieck Therapists Association (VvOCM) guideline on non-specific low back complaints in 2009,[41] new insights have been obtained with regard to diagnosing and treating patients with LBP and LRS. Therefore, a revision was deemed necessary. Besides, more detailed practical recommendations were required concerning LRS without alarm symptoms. The scope of the current guideline was extended with LRS without alarm symptoms to align with clinical practice and with the National Institute for Health and Care Excellence (NICE) guideline on LBP and sciatica.[31] The purpose of this paper is to describe the development of the revised KNGF guideline LBP and LRS and to discuss a selection of clinical questions that were addressed in the full version of this guideline (Table I). The close correlation between physical therapy and exercise therapy was the impetus for the KNGF and VvOCM to develop one joint guideline. The aim was to optimize clinical decision-making process, to improve patient outcomes and also to offer transparency for other healthcare providers and stakeholders.

Recommendations for assessment and treatment resulting from the guideline development process on the main topics are presented. Whenever 'LBP' is mentioned, this means both LBP and LRS, without signs and symptoms that could indicate an underlying serious pathology (alarm signs and symptoms). If different or supplementary recommendations apply to patients with LRS, these are described in a separate section.

Population

The guideline applies to patients above the age of 16 years suffering from LBP with or without LRS. LBP means back pain between the lowest ribs and the buttock folds. LBP

TABLE I.—*The 16 clinical questions concerning low back pain (LBP) and lumbosacral radicular syndrome (LRS) that were formulated and assessed.*

Item	Clinical questions
1	Which etiological factors are recommended to analyze during the medical history taking and the physical examination?
2	Which prognostic factors are recommended to analyze during the medical history taking and the physical examination?
3	Which information is collected when taking the medical history of a patient?
4	Which information is collected during a physical examination?
5	When is it necessary to refer a patient to the general practitioner?
6	What are the criteria for initiating physical therapy or exercise therapy?
7	How can patients best be assigned to treatment profiles?
8	Which measurement instruments best analyze the ICF domains and goals?
9	Which information and advice and (pain) education is recommended?
10	Are exercise therapy in general, motor control exercises and Mechanical Diagnosis and Therapy (MDT) according to McKenzie recommended? Which type of exercise therapy within the domain of the physical therapist is recommended for which patient?
11	Which frequency, intensity, type and time span of exercise therapy is recommended?
12	Are behavior-oriented treatments administered by a physical therapist recommended? Which form of behavior-oriented treatment is recommended for which patient?
13	Are passive articular mobilizations and/or manipulations (high-velocity-thrust techniques), either as a supplement to exercise therapy or on their own, recommended?
14	Is massage, as a supplement to exercise therapy, recommended?
15	Are transcutaneous electrical nerve stimulation (TENS) and interferential therapy, either as a supplement to exercise therapy or on their own, recommended?
16	Which initiation and discontinuation criteria are employed for physical therapy?

ICF: International Classification of Functioning, Disability and Health.
Questions #2, 7, 9, 10, 12, and 13 are addressed in this article.

may be accompanied by pain into one or both buttocks and/or legs. If the pain is radicular in nature, then this is LRS. The current guideline applies to patients with an initial or relapse episode of LBP and covers all phases of back pain: acute (0-6 weeks), subacute (6-12 weeks) and chronic (>12 weeks). The current guideline does not apply to patients with a (suspected) rare cause of the back pain, such as inflammation (*e.g.* ankylosing spondylitis, radiculitis), serious spinal column pathology (*e.g.* malignancies, infections, vertebral fractures) or serious neurological symptoms (as a result of *e.g.* spondylolysis, spondylolisthesis, foraminal or canal stenosis), pregnancy-related LBP and/or pelvic pain, coccygodynia (tailbone pain), low back and/or pelvic pain based on visceral problems and complaints that can be directly related to a surgical procedure on the low back in the past 12 months. Also, the current guideline does not apply to patients with severe neurological disorders such as cauda equina syndrome or patients with a LRS and severe motor deficit (Medical Research Council (MRC) score ≤3 out of 5), and/or severe pain (numerical pain rating score [NPRS] ≥8).

Methods

This guideline was developed in accordance with the 2019 KNGF guideline methodology.[42] This methodology is based on the AGREE II statement and the AQUA guideline.[43, 44] The Grading of Recommendations Assessment, Development and Evaluation methodology (GRADE) method is used within the KNGF guideline methodology for assessing the certainty of the evidence and for the evidence-to-decision process.[45-48] The process consists of four phases: 1) preparation; 2) development; 3) review and authorization; 4) dissemination and implementation. This article focuses on the preparation, development and review of the guideline and describes in detail a selection of topics of the guideline.

Preparation phase

In the period between November 2018 and February 2019, a project group (five members), a guideline panel (13 members) and a review panel (14 members) were set up containing representation from the relevant stakeholders. The project group consisted of guideline methodology experts (N.S., D.C., G.M.), and researchers in the field of physical therapy and LBP (A.A., R.O.). The task of the project group was to perform focus groups, formulate clinical questions, perform literature searches, draw conclusions based on the literature, formulate concept recommendations, prepare and guide guideline panel discussions, and to write a draft version of the guideline and a manuscript. The guideline panel consisted of researchers, physical therapists working or lecturing in the field of LBP, an occupational therapist, a patient representative of the Dutch Association of Back Patients 'the Spine,' a general practitioner, an anesthesiologist, and a work-related movement specialist. The task of the guideline panel was to formulate clinical questions and ensuing research questions, comment on the literature searches and conclusions, and to draft texts produced by the project group. The review panel consisted of researchers, physical therapists working or lecturing in the field of LBP, an occupational therapist, a sports physician, an orthopedic surgeon, a neurologist, a rehabilitation physician and a health insurer. The task of the review panel was to comment on the literature searches and conclusions and to critically review the draft guideline texts and recommendations. An independent guideline expert chaired the meetings of the project group with the guideline and review panel. All members signed a declaration of interests at the start and at the completion of the project.

Development

A first step was to identify barriers regarding the assessment and treatment of patients with LBP with or without LRS. Two focus groups were organized in which 18 physical therapists took part. Besides, five patients completed questionnaires with this goal. The identified barriers were presented by the project group to the guideline and review panel during separate meetings, during which barriers of the members themselves were also identified. All of these barriers were then prioritized and converted into 16 clinical questions by the project group in close collaboration with the guideline panel (Table I). Only a selection of the clinical questions (item 2, 7, 9, 10, 12 and 13) (Table I) are discussed in this article as a result of limited space. Readers are encouraged to refer to the references and to read the full version of the guideline in which all details regarding study methodologies and the elaboration of all clinical questions are available.[49]

The project group used the British (multidisciplinary) guideline 'LBP and sciatica in over 16s: assessment and management'[31] as a basis. The guideline, published by the National Institute for Health and Care Excellence (NICE) in 2016, has high methodological quality and focuses on LBP with or without sciatica (neuropathic pain radiating into the lower limbs). The NICE guideline updated their systematic searches until December 15th, 2015.

The project group started in 2019 with clinical questions 1, 2, 7 (Table I). An information specialist carried out a systematic search about etiological or prognostic factors for persistent LBP and three classification systems and the associated targeted treatments (see section Prognostic factors and Treatment profiles). After this, on April 14th, 2020 the project group of the KNGF guideline instructed an information specialist to carry out a systematic search for systematic reviews and evidence-based guidelines for patients with LBP for the period January 1st, 2015 until April 14th, 2020. The search in PubMed, MEDLINE, Embase, Emcare, Web of Science and the Cochrane Library produced 2439 unique hits. The results were supplemented by the findings from Dutch-language evidence-based guidelines on treating patients with LBP that were not included in the selected databases.[28, 29, 50-56] For each clinical question, an assessment was done to see whether there were published guidelines, systematic reviews or narrative reviews among these unique hits with which clinical questions could be answered, whether the studies met the inclusion criteria and whether the studies were sufficiently current and of sufficient methodological quality.

Clinical questions about TENS, massage and mobilization/manipulation could not be answered by published systematic reviews and evidence-based guidelines. For these three interventions the project group carried out a systematic review itself. This paper summarizes the elaboration of the clinical question mobilization/manipulation. Details regarding systematic reviews with all supportive material are described in detail in the full version of the KNGF guideline.[49] When appropriate, a PICO framework (patient, intervention, comparison and outcome) was used to guide the review process. Findings of reviews were analyzed according the GRADE method and based on two components: The effect of the intervention and the certainty of the evidence for the effects (also referred to as quality of evidence or confidence in effect estimates). The certainty of the evidence was determined as high, moderate, low, or very low (Table II) considering comprehensively the components of risk of bias (assessed in accordance to the Cochrane risk of bias tool), inconsistency, indirectness, imprecision, and publication bias.

In consultation with the guideline panel, the project group selected quality of life, pain, and physical functioning as critical outcome measures and work resumption as an important outcome measure.[57-59] Also, undesirable effects that may be related to the intervention were analyzed when available.

In consultation with the guideline panel a format was used to interpret the size of effect as an indication (Table III). The values are commensurate with the NICE guideline on LBP and sciatica,[31] and the KNGF guideline on rheumatoid arthritis.[60]

Subgroups of the guideline panel formulated additional considerations based on the GRADE evidence-to-decision framework. The discussion was structured by the use of an evidence-to-decision form. GRADE evidence-to-decision framework includes a discussion on the balance between benefits and harms, the quality of the evidence, the values and preferences of patients and clinicians, and the feasibility, equity, and acceptability.[45, 46] For each clinical question strong (offer or do not offer) or conditional (consider or consider not to) recommendations in favor of or against the intervention were formulated. The recommendations were discussed in eight meetings with the guideline panel

TABLE II.—*GRADE approach to certainty of evidence.*

High	The actual effect is close to the estimation of the effect
Moderate	The actual effect is likely close to the estimation of the effect, but it is possible for the actual effect to substantially deviate from the estimation of the effect
Low	The actual effect may differ substantially from the estimation of the effect
Very low	The actual effect likely differs substantially from the estimation of the effect

GRADE: Grading of Recommendations Assessment, Development and Evaluation methodology.

TABLE III.—*Interpretation of the size of effect.*

Parameter	Small effect	Moderate effect*	Large effect*
Standardized mean difference (SMD)	<0.3	0.3 to 0.5	>0.5
VAS/NPRS (0-10), MD	<1	1 to 2	>2
RMDQ (0-24), MD	<2	2 to 5	>5
ODI / QBPDS (0-100), MD	<10	10 to 20	>20
Quality of life (SF-12, SF 36, PCS 0-100), MD	<10	10 to 20	>20
Quality of life (SF-12, SF 36, MCS 0-100), MD	<10	10 to 20	>20

VAS: Visual Analogue Scale; NPRS: Numeric Pain Rating Scale; MD: mean difference; RMDQ: Roland Morris Disability Questionnaire; ODI: Oswestry Disability Index; QBPDS: Quebec Back Pain Disability Scale; SF-12: 12-items Short Form Health Survey; SF-36: 36-items Short Form Health Survey; PCS: physical component summary; MCS: mental component summary.
*A moderate and large effect are also considered to be clinically relevant.

TABLE IV.—*Implications of strong and weak recommendations for different users of guidelines.*[47, 61]

Recipients	Strong recommendation	Weak recommendation
For patients	Most individuals in this situation would want the recommended course of action and only a small proportion would not	The majority of individuals in this situation would want the suggested course of action, but many would not
For clinicians	Most individuals should receive the recommended course of action. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator. Formal decision aids are not likely to be needed to help individuals make decisions consistent with their values and preferences	Recognize that different choices will be appropriate for different patients, and that you must help each patient arrive at a management decision consistent with her or his values and preferences. Decision aids may well be useful helping individuals making decisions consistent with their values and preferences. Clinicians should expect to spend more time with patients when working towards a decision
For policy makers	The recommendation can be adapted as policy in most situations including for the use as performance indicators	Policy making will require substantial debates and involvement of many stakeholders. Policies are also more likely to vary between regions. Performance indicators would have to focus on the fact that adequate deliberation about management options has taken place

and six meetings with the review panel until consensus was achieved. Implications of strong and weak recommendations for different users of guidelines are presented in Table IV.

Review and authorization

The concept guideline was sent to several selected physical therapists, the Dutch Scientific College of Physical Therapy, associations of professional content (APCs) and to other professional groups and stakeholders who are involved in caring for patients with LBP.

The collected comments were summarized in a comments table, which was presented to the guideline and review panel. They determined which changes and/or additions were required or desired to be made to the concept guideline. After being adopted by the guideline panel and the review panel, the guideline was presented to all involved stakeholders for authorization. All relevant professional associations and patient organizations approved the guideline. The guideline and its supporting documents were published in Dutch in 2021 and English in 2022 at the KNGF website in open access. Full and more detailed information about this guideline can be found in https://www.kngf.nl/kennisplatform/guidelines.[49]

Results of clinical questions and recommendations

Prognostic factors

Clinical question (Table II, Nr. 2)

Which prognostic factors are recommended to analyze during the medical history taking and the physical examination?

Method

In order to answer the clinical question, a systematic search was conducted for existing systematic reviews, possibly as part of an evidence-based guideline. Three sources were selected that describe etiologic or prognostic factors: the KNGF guideline on LBP,[40] the Dutch General Practitioner guideline non-specific LBP,[54] and part 1 of the Lancet series on LBP.[4] From these sources eight reviews were selected that assessed prognostic factors for LBP.[5, 17, 62-67] Because the latter two sources did not conducted a systematic search, the project group conducted an additional systematic search on 23rd July 2019 for systematic reviews about etiological or prognostic factors for persistent LBP that were published after January 1st, 2012. The search yielded 1126 hits of which 1060 articles were excluded based on title and abstract. Of the remaining 66 articles, the full text was assessed. With this systematic search five additional reviews were included,[68-72] resulting in 13 systematic reviews.

The results were summarized and thereafter described. The prognostic factors to be included in the guideline were selected based on consensus, with the following components having been assessed:

- the number of studies included in the systematic review that were relevant for the risk factor;
- the unequivocal nature of the burden of proof: Do the systematic reviews yield the same results or are the results conflicting?
- the association: Are the results statistically significant and/or clinically relevant?
- the applicability: Does the factor constitute a trait for the treatment of the physical therapist and can the factor be properly assessed?

Results and conclusions from the literature study

The following prognostic factors that predict poor recovery were selected by the guideline panel for inclusion in the guideline: previous episodes of LBP,[5, 17] a high degree of limitations in activities,[5, 17, 62, 70] pain in the leg or sciatica,[5, 17, 62, 70, 71] high intensity of pain,[5, 17, 70, 71] bad general health status or quality of life,[5, 17, 62, 64, 70] psychological and psychosocial stress,[5, 62, 64] pain-related fear of movement,[5, 17, 64, 66, 71] feelings/symptoms of depression,[5, 62, 64, 67, 70, 71] passive coping,[5, 64] patient's negative expectations about recovery,[62, 64, 68, 70] or catastrophizing,[65] a high degree of physical load at work,[5, 17, 62, 70, 71] bad relationships with colleagues,[62] and diminished job satisfaction.[5, 17, 64, 70]

Evidence to decision

Our research provides a current summary of prognostic factors of poor recovery in LBP. There is a lot of information about prognostic factors that predict poor recovery, but the results of systematic reviews are sometimes conflicting and there is still uncertainty about the value of this for daily practice. Besides, there is hardly any information about prognostic factors that predict good recovery. However, it is believed that a strong recommendation regarding analysis of prognostic factors is in order given the small amount of effort needed to analyze the factors during the medical history taking. It is plausible that a dominant factor or a combination of prognostic factors impedes the chance of recovery. The acquired information is important within the scope of the clinical decision-making process, in shaping the therapy or when referring patients to other (para)medical professionals. The overview of the prognostic factors is not exhaustive. Therefore it is important to apply the clinical expertise of the practicing physical therapist in order to identify other potential prognostic factors (related or not related to back pain) during the diagnostic process and to use these in evaluating the risk of persistent complaints. These may be prognostic factors that can promote recovery (*e.g.* getting the recommended amount to move each week and good social support) or ones that can impede recovery (*e.g.* pain elsewhere in the body and decreased capacity as a result of co-morbidity) (Table V).

TABLE V.—*Recommendations on prognostic factors.*

Assess the following prognostic factors for persistent LBP and LRS	
Factors related to LBP	Previous episodes of LBP and LRS A high degree of limitations in activities Pain in the leg High intensity of pain
Patient-related factors	Bad general health status or quality of life
Psychosocial factors	Psychological and psychosocial stress* Pain-related fear of movement Feelings/symptoms of depression Passive coping style Negative expectations about recovery or catastrophizing
Work-related factors	High degree of physical load at work Bad relationships with colleagues Diminished job satisfaction
Consider using measurement instruments when analyzing prognostic factors. There are no strict cut-off values available for most measurement instruments, and use of strict cut-off values is also not recommended	

*Psychosocial distress resulting from LBP and LRS, without a specific psychological or psychiatric diagnosis.

Treatment profiles

Clinical question (Table II, Nr. 7)

How can patients with LBP best be assigned to treatment profiles?

Method

To answer the clinical question, a literature analysis was carried out on the following classification systems and the associated targeted treatments:

- classification-based Treatment system according to Delitto (CBT);
- classification-based Cognitive Functional Therapy according to O'Sullivan (CB-CFT);
- treatment based on the STarT Back Screening Tool (SBST)

The literature review was conducted in a hierarchical manner; first the NICE guideline on LBP and sciatica[31] was checked. The NICE guideline included six studies.[73-78] The project group excluded one study based on the selection criteria that were formulated beforehand within the scope of our three targeted treatments.[75] On May 8, 2019, an information specialist conducted a systematic search to update the NICE guideline for the period between January 1st, 2015 until May 8th, 2019. This search produced 268 unique hits. After screening of the title and the abstract based on the inclusion criteria, 253 articles were excluded. Full text was screened for 15 articles; ultimately, the search yielded one additional study.[79] The total number of studies in this literature analysis hence amounts to six.[73, 74, 76-79] The Cochrane Risk of Bias tool[80] was used by NS to judge the risk of bias of the individual studies. The judgement of the various items was discussed with AA and RO, after which consensus was achieved. The effect of the

three targeted treatments compared to treatment without risk stratification was assessed and results in the short term and long term were pooled if possible.

Results and conclusions from the literature study

The effect of treatment based on the CBT was compared to treatment without risk stratification in two studies.[73, 76] On the short term (≤4 months) there was a small (not clinically relevant) (Table III) negative effect on pain with very low certainty of evidence and on physical functioning with low certainty of evidence. There was a small positive effect on the physical and mental component of quality of life with the evidence being of very low certainty. There was a positive effect on the number of patients without work restrictions with very low certainty of evidence. Furthermore, on the long term (>4 months) there was a small positive effect on pain with very low certainty of evidence and on physical functioning with low certainty of evidence. There was a small negative effect on the physical component of quality of life and a small positive effect on the mental component of quality of life with the evidence being of low certainty. There was a positive effect on the number of patients without work restrictions with very low certainty of evidence.

The effect of CB-CFT was compared to treatment without risk stratification in one study.[78] On the short term (≤4 months) there was a large (clinically relevant) (Table III) positive effect on pain and a moderate (clinically relevant) (Table III) positive effect on physical functioning with the evidence being of very low certainty. Furthermore, on the long term (>4 months) there was a moderate positive effect on pain and a small positive effect on physical functioning with the evidence being of very low certainty. There was a positive effect on the number of patients without work restrictions with very low certainty of evidence.

The effect of stratification with SBST was compared to treatment without risk stratification in three studies.[74, 77, 79] On the short term (≤4 months) there was a small positive effect on pain and on physical functioning with moderate certainty of evidence. There was a small positive effect on the physical component of quality of life and no effect on the mental component of quality of life with moderate certainty of evidence. There was a positive effect on work-related outcomes (number of absenteeism hours due to back pain) with very low certainty of evidence. Furthermore, on the long term (>4 months) there was a small negative effect on pain with very low certainty of evidence and on physical functioning with moderate certainty of evidence. There was a small positive effect on the physical and mental component of quality of life with the evidence being of moderate certainty. There was a positive effect on work-related outcomes (number of absenteeism hours due to back pain) with very low certainty of evidence.

In conclusion, for CBT according to Delitto, small (not clinically relevant) effects were found on the critical outcome measures, with very low certainty of evidence. For CB-CFT according to O'Sullivan, clinically relevant effects were found on some critical outcome measures, with very low certainty of evidence. For treatment according to the SBST, small (not clinically relevant) effects were found on the critical outcome measures, with moderate certainty of evidence.

The exact results can be found in the KNGF LBP and LRS guideline.[49]

Evidence to decision

Based on the above, the guideline panel does not recommend assigning patients to treatment profiles based on CBT or CB-CFT, given the lack of scientific evidence of the classification systems. Besides there are also uncertainties about the psychometric properties of the systems and limitations in the feasibility to implement the systems as determined by the guideline panel. The use of the SBST may be of value for practicing physical therapists because the tool is easy to use and clearly gives direction and structure to therapy, thereby helping facilitate clinical decision-making. However, the effects of this patient classification instrument are small in comparison to treatment without risk stratification. Moreover, the (cost-) effectiveness of treatment according to the SBST in the Dutch setting is as yet unknown. Therefore it is believed that it is not desirable to base the risk of persistent complaints exclusively on the SBST, given the limited scientific evidence and because important prognostic factors (*e.g.* work-related factors) can be missed. A conditional recommendation for the SBST is hence justified.

Assignment to treatment profiles

The guideline panel has developed three treatment profiles; low risk, moderate risk and high risk of persistent LBP. These profiles are based on the findings in the literature on prognostic factors and classification systems, clinical expertise and in cooperation with the guideline panel. The evaluation of the risk of persistent LBP can offer important information for the timely initiation of the correct treatment strategy. The guideline panel therefore believes that patients with LBP can best be assigned to treatment profiles based on the most important prognostic factors for persistent LBP. Based on the evaluation of the risk of persistent complaints, the practitioner chooses one of the three treatment profiles.

TABLE VI.—*Recommendations treatment profiles.*

Evaluate the risk of persistent complaints upon initial contact with the patient by assessing whether there are prognostic factors for persistent LBP complaints (see prognostic factors). Then select among the following profiles:	
Profile 1	• Low risk of persistent symptoms There are no dominant* prognostic factors for delayed recovery present
Profile 2	• Moderate risk of persistent LBP There are some non-dominant* prognostic factors for delayed recovery present
Profile 3	• High risk of persistent LBP There are dominant* prognostic factors for delayed recovery present
Based on the treatment profiles, consider offering simpler and less intensive support to people who are likely to recovery quickly and more complex and intensive support to people with a higher risk of persistent complaints	
StarT Back Screening Tool (SBST)	Consider using the SBST to support the evaluation of the risk of persistent complaints. Never base the evaluation solely on the SBST

*Dominant/non-dominant: a dominant presence is when the factor greatly contributes to perpetuating the pain and/or limitations in physical functioning.

The guideline panel recognizes that assignment to treatment profiles, applied based on the individual evaluation by the physical therapist, requires further development (Table VI).

ADDITIONAL REMARKS

Based on the profile classification, more intensive therapy is recommended for patients with a higher risk for persistent LBP and less intensive therapy for patients with a lower risk for this. For patients in treatment profile 1, the clinician is recommended to focus on information and advice and to give instructions for exercises to be performed independently. Because there is a low risk of persistent complaints in treatment profile 1, the number of treatment sessions for patients with this profile must be limited as much as possible to a maximum of three sessions. For patients with treatment profile 2 and 3 no treatment ranges have been formulated, because the complaints can be more varied, and the evaluation by the patient and the therapist is decisive for ending the treatment.

Patients in treatment profile 3 need more sophisticated treatments compared to patients in profile 2. In the presence of several dominant psychosocial factors patients can be treated with psychologically informed physiotherapy. It should be noted that patients with LRS have a greater chance of being assigned to profile 3 compared to patients with LBP without LRS. Patients with LRS are more often confronted with dominant prognostic factors for delayed recovery like a high degree of limitations in activities, pain in the leg and high intensity of pain.

Advice and (pain) education

Clinical question (Table II, Nr. 9)

Which information and advice and (pain) education is recommended for patients with LBP?

Method

To answer the clinical question, literature was used, in consultation with the guideline panel, that was identified based on a systemic search for evidence-based guidelines and systematic reviews (see section Development). This search was supplemented by information from national guidelines for LBP.[28, 29, 50-56] The results were summarized and thereafter described.

Results and conclusions from the literature study

Information and advice is recommended for all patients with LBP.[81-83] The information and advice takes place during the preliminary stage, during the treatment and during follow-up care. Recurring topics in recent literature regarding the contents of the information and advice for LBP are the importance of:

- providing information and offering reassurance about the nature and the diagnosis of LBP;[54, 81, 84]
- information about the treatment options;[54, 84]
- offering certainty about the prognosis of LBP;[81-86]
- avoiding language that encourages fear of pain and catastrophic thinking (*e.g.* terms like injury, degeneration or wear and tear);[81]
- encouragement to stay active and limit bed rest;[54, 81-83, 85, 86]
- encouraging self-management for recovery, the importance of active coping strategies, positive emotions and a healthy lifestyle;[55, 81, 86]
- clear, consistent and personalized information;[84]
- supporting the information and advice with models, videos, folders and/or a decision-making aid.[28]

(PAIN) EDUCATION

For some patients information and advice alone are not sufficient. (Pain) education goes beyond information and advice. The Chronic Pain Healthcare Standard, which focuses on general chronic pain, states the following about (pain) education: '(Pain) education effectively creates conditions and enables organization of activities and learning processes aimed at increasing knowledge and insight, as well as improving opinion building, bringing about behavioral changes and learning skills'.[55] According to

this healthcare standard, a one-sided biomedical approach to pain complaints by a healthcare professional can help maintain pain. In the long or short term, this one-sided approach can result in limitations in daily life and in an adverse experiencing of the pain (*e.g.* overestimating the severity and influence of pain, *i.e.* catastrophizing).[55] In recent years a shift has taken place towards biopsychosocial education, which focuses on the function of the spine, information about remaining active and information about coping with pain. Such biopsychosocial (pain) education may be effective in the treatment of LBP.[87]

The explanation can vary from general information and advice to intensive (pain) education and is aligned with the knowledge level and problems of the patient and his/her environment.[55]

Evidence to decision

Several systematic reviews have been carried out on information and advice and (pain) education of LBP, however there is still uncertainty about when information and advice are no longer sufficient and the practitioner must switch to (pain) education. The guideline panel believes that (pain) education is the best choice for patients with treatment profile 3, *e.g.* if there is unrealistic pain-related fear of movement and/or catastrophizing.

'Reassure the patient' is a common advice to healthcare providers who see patients with LBP. However, there are indications in the literature that a reassuring message aimed at offering information about a good prognosis of LBP is mainly adequate for patients who exhibit little stress and have an adaptive pain response pattern. For other patient groups, this message may be insufficient or even counterproductive.[88] Patients with LBP need clear, consistent and personalized information about the prognosis, treatment options and self-management strategies.[84, 88, 89]

During the barrier analysis in the focus group, the physical therapists indicated that the term 'non-specific' does not do justice to the patient's complaints and may evoke a negative association. It was therefore decided to include a recommendation in the guideline about avoiding the term 'non-specific' (Table VII).

Exercise therapy

Clinical questions (Table II, Nr. 10)

Are exercise therapy in general, motor control exercises and Mechanical Diagnosis and Therapy (MDT) recommended for patients with LBP?

Which type of exercise therapy within the domain of the physical therapist is recommended for which patient?

Method

To answer the clinical question, literature was used, in consultation with the guideline panel, that was identified based on a systemic search for evidence-based guidelines and systematic reviews (section Development). This search was supplemented by information from national guidelines for LBP.[28, 29, 50-56] The results were summarized and thereafter described. The recommendations were formulated based on the GRADE Evidence-to-Decision Framework.[45, 46]

Results and conclusions from the literature study

Exercise therapy in general

Based on the systematic search, 15 systematic reviews[90-104] were identified that describe the effectiveness of exercise therapy. The AMSTAR-2 rating of the overall confidence in the results of the review was high for one systematic review,[95] moderate for two[90, 104] and low for the other 12 reviews. For patients with acute and subacute LBP, no clinically relevant effects of exercise therapy on pain and physical functioning were found compared to no exercise therapy, with low certainty of evidence. Also when exercise therapy is compared to other conservative treatment in patients with acute and subacute LBP, no clinically relevant differences were found. This applies to both the short term and the long term. For patients with chronic LBP, the most recent systematic review of high methodological quality found a clinically relevant effect of exercise therapy compared to no exercise therapy on pain and physical functioning in the short term, with moderate certainty of evidence.[95] For exercise therapy compared to other conservative treatment, conflicting results were found for pain and physical functioning in the short term; the small (not clinically relevant) effects were sometimes in favor of exercise therapy and sometimes in favor of other conservative treatments. In the long term, no clinically relevant effects of exercise therapy were found for these outcome measures compared to no exercise therapy or other forms of exercise therapy.

Motor control exercises (MCE)

The effectiveness of MCE is described in 12 systematic reviews.[103, 105-115] None of the systematic reviews were qualified of high or moderate methodological quality according to the AMSTAR-2 score. The effectiveness of MCE compared to no treatment in patients with acute LBP is unknown. Also, there is much uncertainty about the effects of MCE for acute LBP compared to other forms of exercise therapy or manual therapy, given the predominantly low certainty in the evidence. The available evidence does not show clini-

TABLE VII.—*Recommendations on advice and (pain) education.*

Give patients with LBP in treatment profiles 1, 2 and 3 information and advice	
Type of information and advice	• Integrate information and advice as a part of the therapy for all patients with LBP. The information and advice takes place during the preliminary stage, treatment and follow-up care • Provide the patient with clear, consistent and personalized information and communicate with empathy in clear, comprehensible language • Avoid language that encourages fear of pain and catastrophic thinking (*e.g.* terms like: injury, degeneration or wear and tear) • Use the term 'LBP' and avoid the term 'non-specific' • Consider employing (pain) education in addition to information and advice for patients with profile 3, *e.g.* if there is unrealistic pain-related fear of movement and/or catastrophizing
Information and advice for patients with LBP	
The nature of LBP	• Explain that it is often unclear how LBP exactly arises and that there is often a combination of factors present
The course and prognosis	• Explain that LBP occurs often and frequently returns, and that the severity and duration of the LBP can differ each time • Explain that after three months about half of the patients are pain-free and physical functioning has been recovered
Inhibiting and facilitating factors (if applicable)	• Explain that recovery can be expedited by remaining active and limiting bed rest, self-management for recovery, active coping strategies, positive emotions and a healthy lifestyle • Explain that the presence of negative prognostic factors can cause the recovery to progress less rapidly
Diagnosis	• Explain that the vast majority of people with LBP have no indications for an underlying rare condition • Explain that diagnosis of LBP typically takes place in the primary care setting, by the general practitioner and/or by the physical therapist* • Explain to patients who need information about imaging diagnostics (X-ray or Magnetic Resonance Imaging [MRI]) that this type of diagnostics is not recommended for patients with LBP without warning signs
The treatment options	• Explain that treatment of LBP typically takes place in the primary care setting, by the general practitioner and/or by the physical therapist • Explain that the treatment focuses on an active approach. Inform the patient about how to adequately deal with the pain and the consequences of pain
Information and advice for patients with LRS	
The nature and diagnosis	• Explain that LRS is characterized by the stimulation of a nerve root in the back, usually due to a herniated intervertebral disc, and that this results in sciatica and sometimes also in sensory disorders and loss of strength in the area innervated by this nerve. Also explain that the herniated intervertebral disc retracts on its own in most cases
The course and prognosis	• Explain that LRS significantly recovers in most patients in the first three months, without requiring surgical intervention
Diagnosis	• Explain to patients who need information about imaging diagnostics (X-ray or MRI) that the medical specialist will decide whether or not the patient is eligible for this • Explain that a MRI is indicated if there are signs of a rare cause of the back complaints, or if the symptoms of LRS are so debilitating and/or long-lasting that surgery or another specialized therapy is considered • Explain that proving a hernia nuclei pulposi (HNP) by means of a MRI has no added value in conservative treatment
The treatment options	• Explain that, in case of a LRS, the treatment is generally conservative during the first three months • Advise the patient to continue moving and engaging in daily activities (including work) if complaints permit • Explain that several days of bed rest is an option if moving causes a major exacerbation of the complaints, but that bed rest does not contribute to faster recovery • Advise the patient to move guided by the pain and to gradually increase physical activity. Keep in mind that increased pain should be prevented in the presence of high irritability. High irritability is defined as: a lumbar flexion range of motion (ROM) of 0 to 30 degrees, constant pain in the leg, night-time pain, morning pain or stiffness lasting longer than 60 minutes and when walking a short distance does not lead to pain alleviation. Moderate irritability is defined as intermittent moderate pain, with short-term increased pain (during a part of a day) being deemed acceptable • Explain that if the complaints have not sufficiently improved after six to eight weeks, a referral to the physician / general practitioner will be provided so that the treatment options can be discussed: continued conservative treatment or a secondary care referral to carry out further examination
Advise the patient with LRS to immediately contact the general practitioner in the event of: • saddle numbness • unintentional loss of urine or bowel movement or inability to urinate • increasing loss of muscle strength in the legs	

*Do not explain diagnosis of LBP if you are not competent and authorized to do this or you have insufficient knowledge to determine diagnosis.

cally relevant differences between MCE and other forms of exercise therapy or manual therapy on pain or physical functioning in the short and long term. For patients with chronic LBP, evidence was found of a clinically relevant effect on pain when MCE was compared to minimal intervention (placebo physical therapy, education or advice and no treatment) in the short and long term, but no clinically relevant effect was found on physical functioning (low to moderate certainty of evidence). However, no clinically relevant difference was found between MCE and other forms of exercise therapy on pain and physical functioning in the short and long term (low to high certainty of evidence).

Mechanical diagnosis and therapy (MDT) according to McKenzie

The effectiveness of MDT is described in six systematic reviews,[116-121] and all were found of critically low methodological quality according to the AMSTAR-2 score. There is conflicting evidence of a short-term effect of MDT on pain in patients with acute LBP. In systematic reviews, clinically relevant differences were found when compared to another intervention but not when compared with passive therapy. No clinically relevant short-term effect of MDT was found on physical functioning in this patient group. In patients with chronic LBP, MDT does not lead to clinically relevant effects on pain and physical functioning in the short term compared to another intervention. The long-term effect of the method is not known in patients with chronic LBP.

Evidence to decision

In patients with chronic LBP, exercise therapy produces a clinically relevant alleviation of pain and improvement of physical functioning in the short term when exercise therapy is compared to no exercise therapy, with moderate certainty. There is still a lot of uncertainty about the effectiveness of exercise therapy compared to no exercise therapy in the long term. It is also still uncertain whether exercise therapy in patients with acute LBP is effective. Nevertheless, the guideline panel believes that exercise therapy can be recommended for all patients with LBP.

The guideline panel arrived at this decision based on the following considerations:

- Exercise therapy, if done correctly, is assessed as safe.
- There are indications that exercise therapy for patients with subacute and chronic LBP is cost-effective when compared to usual care and is associated with healthcare cost savings.[122]
- Exercise therapy in patients with LBP is considered an important intervention within healthcare and is recommended in (inter)national guidelines.[28, 29, 31, 54, 85, 86, 123]
- Exercise therapy encourages an active lifestyle and patient's self-reliance; this matches the emphasis placed by the guideline on an active approach.
- The recommendation concerns only patients for whom an indication for physical therapy or exercise therapy has been determined. Within this group of patients, exercise therapy in combination with information and advice is the principal intervention based on which a physiological effect can be expected.

The guideline panel strongly recommend exercise therapy for patients with an indication for physical therapy within profile 2 and 3. For patients with LBP who are assigned to profile 1, a conditional recommendation has been formulated. Instructions for exercises to be independently performed can be considered if these are aligned with the patient's need for assistance and need for care. Keeping costs manageable plays an important role in these recommendations.

The current literature does not provide a definitive answer as to which form of exercise therapy is indicated for which patient. In general, it does not appear from the literature review that one form of exercise therapy is more effective than another. The guideline panel believes that the best choice is based on the patient's needs, preferences and capabilities and the therapist's knowledge and skills.

Although there are still uncertainties about the cost-effectiveness of exercise therapy in a group setting compared to individual therapy, the guideline panel considers it likely that exercise therapy in a group can result in cost savings. Group exercise therapy is particularly useful for the longer treatment courses, whereby repeated incentives (physiological as well as advice and education and contact with fellow patients) can contribute to recovery. The guideline panel also believes that group exercise therapy can be considered for patients in profile 2 and 3 as a follow-up to one or more individual sessions, if the therapist estimates that this approach will lead to faster recovery (Table VIII).

Behavior-oriented treatments

Clinical questions (Table II, Nr. 12)

Are behavior-oriented treatments administered by a physical therapist recommended?

Which form of behavior-oriented treatment is recommended for which patient?

TABLE VIII.—*Recommendations on exercise therapy.*

Exercise therapy for patients with LBP	
Profile 1	• Consider giving instructions for exercise therapy to be done independently
Profile 2 and 3	• Offer exercise therapy
Type exercise therapy	• Focus the exercise therapy on the patient's needs, preferences and capabilities as determined during the medical history taking and the physical examination • Encourage the patient to resume or expand activities, preferably gradually and in a time contingent manner • Consider group exercise therapy as a follow-up to one or more individual sessions, if you as a therapist estimate that group exercise therapy will lead to faster recovery
Guidance	• If permissible, scale back the guidance during the treatment period and do this in consultation with the patient. In this case, it is important to not decrease the exercise frequency and intensity; the focus will shift to independent exercising and physical activity
Exercise therapy for patients with LRS	
Profile 1,2,3	• Consider exercise therapy if there is a need for assistance related to limitations in activities of daily living and/or social participation based on movement-related functioning
Type exercise therapy	• Focus on pain alleviation in the presence of high irritability. In the presence of moderate irritability, increased pain of short duration (a part of a day) is acceptable • Increase the exercise therapy depending on the pain. If good progress is made, expand the activities to the prior level in 6 to 12 weeks based on the frequency, intensity and time span of the various types of exercise therapy

Research question

Are behavior-oriented treatments administered by a physical therapist, possibly in addition to active treatment, recommended for patients with LBP with or without sciatica for pain alleviation and improved physical functioning and quality of life?

Method

To answer the clinical question, in consultation with the guideline panel, literature was used that was identified based on a systemic search for evidence-based guidelines and systematic reviews (see section development). Three evidence-based guidelines of high methodological quality were used that comment on behavior-oriented and/or cognitive behavioral approaches.[31, 86, 123] This information has been supplemented by information from systematic reviews, and sources from reference lists from these reviews and the three guidelines and by information from national guidelines for LBP.[28, 29, 50-56] To be able to make pronouncements about the effectiveness of behavior-oriented treatments that are administered by an physical therapist, reviews were selected which specifically focus on RCTs and whereby treatment was primarily (≥ 50%) administered by an physical therapist or other paramedical professional (within or without a team-based approach). Only RCTs that were largely (≥ 50%) conducted in a primary care setting or in an outpatient department of a hospital were eligible for inclusion. The results were summarized and thereafter described. The recommendations were formulated based on the GRADE Evidence-to-Decision Framework.[45, 46]

Results and conclusions from the literature study

The NICE guideline on LBP and sciatica[31] and The Belgian national guideline on LBP and radicular pain[86] conclude that behavior-oriented treatment has added value as a supplement to physical therapy for patients with LBP. There is no proof of the effectiveness of isolated forms of behavior-oriented treatment. However, both guidelines state that behavior-oriented treatment in combination with exercise therapy may be cost-effective compared to interventions that do not take into account psychosocial factors.[78, 124, 125] Cognitive behavioral therapy should be considered for people with LBP, with or without radicular pain, but only as part of a multimodal treatment with a supervised exercise program. The guideline of the American College of Physicians (ACP)[123] recommends the following for people with chronic LBP (complaint duration >12 weeks): mindfulness aimed at stress reduction (moderate certainty of evidence), progressive relaxation therapy, EMG feedback, operant therapy and cognitive behavioral therapy (low certainty of evidence).

The systematic search on April 14th, 2020 for systematic reviews (see section development) investigating the effectiveness of behavior-oriented treatments in patients with LBP whereby treatments were administered either entirely or to a significant extent by physical therapists or other paramedical professionals yielded eight literature reviews.[126-133] Two systematic reviews pooled the results[130, 133] and the other six presented a narrative synthesis of the included studies. All reviews were found of critically low methodological quality according to the AMSTAR-2 score.

The systematic reviews generally found positive effects of behavior-oriented treatment (either as a supplement to physical therapy or on its own) compared to various types of control treatments on pain and/or physical functioning in the short term and/or long term. The positive effects on pain and physical functioning were less clear or inconsistent when the behavior-oriented treatment was compared to a physically active treatment. The effectiveness of behavior-oriented treatment was more favorable if it was aligned with the needs of the patient. Three systematic reviews[127, 132, 133] evaluated the adverse effects of behavior-oriented treatment. They concluded that these treatments were not studied frequently, but that the chance of adverse effects is likely very small and that these are rare or never serious.

In two systematic reviews[130, 132] in which the certainty was evaluated according to the GRADE method, the researchers concluded that the certainty for the effectiveness of behavior-oriented treatments is moderate to high.

Evidence to decision

The positive effects of behavior-oriented treatment compared to control treatments varied from small (not clinically relevant) and not significant to moderate (clinically relevant) and significant. Apart from the lack of consistent results, the guideline panel concludes that there are many uncertainties. For example, there are few (large) studies available, and there is uncertainty as to the extent to which results can be compared to each other. For example, RCT's contain a large variety of practitioners, treatment methods and treatment hours, and it is almost impossible to conduct a valid meta-analysis. Besides, the effectiveness of behavior-oriented treatments is assessed to a significant extent on decreasing pain and improving physical functioning. However, with a unilateral focus on pain and physical functioning, the effectiveness of this form of treatment may be underestimated and the mutual differences between treatment methods remain underneath the surface. With behavior-oriented treatments, patients often indicate that they do not experience less pain or improved physical functioning, but that, for example, they are able to cope with the pain better, have accepted the situation and have made room for supportive thoughts and undertaking valuable actions. The results of the eight systematic reviews should also be viewed with some reticence, because they all score critically low in quality according to the AMSTAR 2 method.[134] The guideline panel concluded that there was not enough evidence to make any recommendations for the use of psychological therapies in isolation. However, the guideline panel agreed that it is possible that behavior-oriented treatment in the presence of dominant psychological recovery-impeding factors has a positive effect on pain and physical functioning as a supplement to exercise therapy. These conclusions are in line with the conclusions of the NICE guideline on LBP and sciatica[31] and the Belgian national guideline on LBP and radicular pain.[86] Therefore, the guideline panel deems a conditional recommendation ('consider') for the administration of behavior-oriented treatment to be in order.

The practice

Physical therapists influence the thoughts and behavior of their patients on a daily basis. Techniques and methods such as education, motivational interviewing, the pain-consequences model,[135] behavioral lenses,[136] as well as empathetic listening, or showing the patient and having them experience what is possible, are used. The degree of complexity determines which kind of behavior-oriented techniques or interventions are indicated. For profiles 1 and 2, a thorough explanation and focus on the biopsychosocial model are sufficient. For profile 3, more is expected from the therapist in this regard. Good communication skills and a strong therapeutic alliance are crucial when applying behavior-oriented interventions.[137] Based on mutual trust, the patient can be motivated to move and be therapy compliant. Progress can be made in coping with the LBP and its consequences (self-management), and in acquiring the capability of living one's life as one wants in the physical, social and psychological sense (empowerment).[138, 139]

The guideline panel stresses that it is important for physical therapists to be trained in administering behavior-oriented treatments. The use of questionnaires is promoted for analyzing psychosocial factors in order to prevent important recovery-impeding or recovery-facilitating factors from remaining underexposed. What's more, the questionnaires can be used as support when entering into the dialogue process with the patient and facilitating the awareness process.

Which form of treatment for which patient?

Behavior-oriented treatments within the domain of the physical therapist consist of a wide range of treatment options and theoretical concepts. The discussed three guidelines and eight systematic reviews do not provide a definitive answer about which form of treatment is indicated for which patient or about the desired treatment intensity. The impression that various types of behavior-oriented treat-

ments do not differ or only differ slightly in effectiveness in patients with LBP is confirmed in various other systematic reviews.[140-149]

In order to assess the psychological recovery-impeding factors, the therapist, together with the patient, explores the correlation between complaints, cognitions, emotions and behavior and social aspects. The findings of the medical history taking and physical examination, the patient's needs, preferences and capabilities in combination with the therapist's knowledge and skills are decisive for the definitive choice (Table IX). LBP is a multifactoral biopsychosocial pain syndrome, and various processes can lead to an alleviation of complaints, behavioral change and increased internal self-regulation. The higher the level of complexity, the more necessary it is to refer and to collaborate with other professional caregivers such as the general practitioner, psychosomatic physical therapist and psychologist.

Time-contingent exercise program

When resuming or expanding activities, the recommendation is to gradually improve physical functioning and participation with a time-contingent program. By offering a structured program containing agreements about what (which activity), how (in which way exactly), when (on which days and at what times) and where (at which location) things will be done, the manner and speed of the build-up will not be dictated by the degree of pain someone is experiencing. By guided behavioral experiments and detaching activities from pain, the patient will learn that moving is possible and can have positive effects. This can result in patients building confidence in their own abilities and (re)gaining pleasure in exercise. More knowledge, more skills and a greater amount of self-confidence with regard to handling LBP shall motivate patients to deal with their complaints differently (self-management) and take responsibility for improving the functioning in the various domains of experienced health[150] and quality of life (empowerment).[151] In order to create a successful, gradual, time-contingent program, it is important for the patient to actively participate and formulate meaningful goals and for the therapist to be well aware of the patient's motives when starting treatment.[152]

The diagnostic and treatment process wherein change of the exercise behavior is the focus with a biopsychosocial approach is described in the Exercise Therapy Diagnostics and Intervention Model (ODIM).[41] To date, there has been little research conducted on the effectiveness of structured, gradual, time-contingent exercise programs in the primary care setting where treatment goals were formulated by the patient (Table X).[154]

Table IX.—*Psychosocial prognostic factors for nonrecovery and associated treatment strategies (expert opinion).*

Prognostic factors for nonrecovery	Treatment
Pain-related fear of movement, catastrophizing (*e.g.* expectation of injury when exercising)	*In-vivo* exposure*
A passive coping style, catastrophizing (*e.g.* helplessness/powerlessness)	Graded activity, cognitive behavioral therapy (including ACT), motivational interviewing
Psychological and psychosocial stress (trouble relaxing)	Relaxation therapy
Psychological and psychosocial stress (medical shopping, wanting to maintain control, frustration)	Cognitive behavioral therapy (including ACT), motivational interviewing

ACT: acceptance and commitment therapy.
**In-vivo* exposure is only applicable for challenging cognitions; if you are unable to challenge a certain thought (*e.g.*: 'I'm afraid of ending up in a wheelchair' or 'The pain will never go away'), then *in vivo* exposure is not possible.

Table X.—*Recommendations behavior-oriented treatments.*

Profiles 1 and 2	• A thorough explanation and focus on the biopsychosocial model are sufficient
Profile 3	• Consider behavior-oriented treatment* in patients with dominant (psychosocial) prognostic factors • Consider personalizing the behavior-oriented treatment by aiming this specifically at the psychosocial prognostic factors, as described in Table IX • Focus behavior-oriented treatment on encouraging movement behavior with or despite pain
Type	• Discuss the choice of behavior-oriented treatment with the patient and align with the patient's needs, preferences and capabilities and your own knowledge and skills as a therapist • Only apply the forms of behavior-oriented treatment for which you are competent and authorized

*Forms of treatment aimed at a different manner of dealing with pain are designated as behavior-oriented interventions. These treatment forms use operant (*e.g.* graded activity), cognitive (*e.g.* exposure *in vivo*) and respondent learning processes (*e.g.* relaxation exercises, mindfulness and electromyography biofeedback training [EMG biofeedback]).[40] Behavior-oriented treatment interventions also include interventions such as Acceptance and Commitment Therapy (ACT) and interview techniques (*e.g.* motivational interviewing).[153] Pain education, including learning to deal with pain and anxiety differently, are basic components of graded activity and exposure *in vivo*.

Mobilizations and manipulations

Clinical questions (Table II, Nr. 13)

Are passive arthrogenic mobilizations and/or manipulations (high-velocity-thrust techniques), either as a supplement to exercise therapy or on their own, recommended for patients with LBP?

Research questions

What are the desirable and undesirable effects of manipulation and/or mobilization as a supplement to exercise therapy *versus* exercise therapy possibly in combination with another control intervention without manipulation and/or mobilization in patients with LBP with or without LRS?

What are the desirable and undesirable effects of manipulation and/or mobilization *versus* a control intervention without manipulation and/or mobilization in patients with LBP with or without LRS?

What are the desirable and undesirable effects of manipulation *versus* mobilization in patients with LBP with or without LRS?

Method

The literature review was conducted in a hierarchical manner; the search first focused on existing systematic reviews, possibly as part of an evidence-based guideline. Based on this search, the following sources were identified: the NICE guideline on LBP and sciatica,[31] the Danish LBP or lumbar radiculopathy guideline,[85] and a Cochrane review on chronic LBP[155] and a Cochrane review on acute and subacute LBP. The literature review of the two systematic reviews was from a more recent date than that of the two guidelines but had excluded studies with solely patients with sciatica. These latter studies had been included in the British and Danish guidelines, due to which these guidelines were better aligned with our search. Ultimately, it was decided to use the two reviews as the basic for selecting articles and implement an update of the search for RCTs starting on January 1st, 2018 till June 4th, 2020. Finally, the NICE guideline and the Danish guideline were screened for additional literature with specific attention paid to studies where solely patients with sciatica were selected. The articles from the two systematic reviews and the two guidelines were tested according to pre-defined inclusion criteria. One of the criteria was the type of control intervention. The control intervention should be an intervention within the scope of the guideline (information and advice and (pain) education, exercise therapy, behavior-oriented treatments within the domain of the physical therapist, manipulation, mobilization, massage, dry needling, kinesiotaping, interference and TENS) or sham manipulation or mobilization, placebo or no treatment. Considerations were analyzed according to the GRADE Evidence-to-Decision framework.[45, 46] In consultation with the guideline panel, the project group selected 'pain,' and 'physical functioning' as critical outcome measures and 'quality of life' and 'work resumption' as important outcome measures.[57-59] Also, undesirable effects that may be related to the intervention were analyzed when available.

The analyses of the two reviews and two guidelines provided a total of 51 different RCTs: 31 RCTs[156-186] of the systematic review of patients with chronic LBP,[155] 17 RCT's[175, 187-202] of the systematic review of patients with acute and subacute LBP, four RCTs[203-206] of the NICE guideline[31] and zero RCTs of a more in-depth analysis of the Danish guideline.[85] One article[175] was included in both systematic reviews. The systematic search of recent RCTs yielded 6 additional studies,[207-212] so that the total number of selected articles was 57 articles. All RCTs compared mobilizations and/or manipulations, either as a supplement to exercise therapy or in isolation, with sham manipulation or mobilization, placebo or no treatment or with interventions that were within the scope of the guideline.

Results and conclusions from the literature study

The effect of mobilization and/or manipulation plus exercise therapy was compared with exercise therapy alone or with exercise therapy plus another intervention aligned with the guideline in the short term (≤4 months) in 11 RCTs,[156, 173, 177, 180, 182, 189, 197, 203, 204, 210, 212] and in the long term (>4 months) in seven RCTs.[156, 173, 177, 180, 189, 203, 212] On the short term the effects were small (not clinically relevant) positive on the critical outcome measures pain with low certainty of evidence and on physical functioning with very low certainty of evidence. On the long term the effects were small positive on pain with moderate certainty of evidence and on physical functioning with very low certainty of evidence. On most important outcome measures the effects were small positive with very low to moderate certainty of evidence.

The effect of mobilization and/or manipulation was compared with another intervention aligned with the guideline in the short term (≤4 months) in 21 RCTs,[158, 160, 162, 163, 169, 171, 172, 176, 178, 180, 181, 185, 187, 188, 195, 198, 200, 201, 206, 208, 209] and in the long term (>4 months) in 12 RCTs.[158,

[160, 162, 163, 169, 172, 176, 180, 187, 195, 201, 209] On the short and long term the effects were small positive on pain and physical functioning with low certainty of evidence. On the important outcome measures the effects were small positive or negative with very low certainty of evidence.

The effect of mobilization and/or manipulation was compared with sham mobilization and/or manipulation in the short term (≤4 months) in eight RCTs,[157, 164, 167, 171, 179, 183, 205, 206] and in the long term (>4 months) in two RCTs.[179, 205] On the short term the effects were moderate (clinically relevant) positive on pain, large (clinically relevant) positive on physical functioning and moderate positive on quality of life, with the evidence being of very low certainty. On the long term the effects were small positive on pain with very low certainty of evidence, physical functioning with low certainty of evidence and on quality of life with very low certainty of evidence.

The effect of mobilization and/or manipulation was compared to placebo in the short term (≤4 months) in two RCTs.[165, 184] No RCTs were found that studied the effect in the long term (>4 months). On the short term the effects were small positive on pain with low certainty of evidence, moderate positive on physical functioning with low certainty of evidence and small positive on the number of patients without work restrictions with very low certainty of evidence.

The effect of manipulation was compared with mobilization in the short term (≤4 months) in six RCTs,[159, 161, 168, 186, 190, 192] and in the long term (>4 months) in two RCTs.[168, 190] On the short term the effects for manipulation were small positive on pain with very low certainty of evidence, moderate positive on physical functioning with very low certainty of evidence, and mixt on quality of life with low certainty of evidence. On the long term the effects for manipulation were small positive on pain with low certainty of evidence and moderate positive on physical functioning with very low certainty of evidence. The exact results can be found in the KNGF LBP and LRS guideline.[49]

Almost all studies used the duration of the LBP as a criterion for including or excluding patients. However, when evaluating the results, there were no differences in treatment results between patients with short-term (<4 months) and persistent (>4 months) LBP.

Most studies included a mix of patients with or without LRS. Because there were only a few studies in which exclusively patients with or patients without LRS were included, it was not possible to adequately compare the treatment with the various control interventions.

Evidence to decision

The effects of mobilization and/or manipulation are in general small with the evidence being of very low to low certainty. Despite the small effects and the limited evidence, the guideline panel has formulated a recommendation for considering this type of intervention for patients with LBP if the problem is mechanical in nature due to conditions within the neuromusculoskeletal system. Conditions can consist of decreased (segmental or regional) mobility, a stiff/rigid end-feel or increased muscle tension.[213] The guideline panel offered the following argumentation for this:

- the adverse effects are rarely or never serious, although extensive information about this is limited;
- the results of mobilization and manipulation may have been studied sub optimally, because almost all included studies selected patients based on the presence of LBP without evaluating whether there were also problems with the neuromusculoskeletal system (*e.g.* decreased (segmental or regional) mobility. Pain may not be an adequate criterion for whether or not to administer mobilization and/or manipulation;[214]
- in clinical practice, experiences with mobilizations and manipulations in patients with a movement disorder within the neuromusculoskeletal domain are positive;[213]
- all comparisons for pain and physical functioning are in favor of mobilization and/or manipulation;
- four of the five recent systematic reviews about the cost-effectiveness of mobilizations and manipulations found some evidence of the cost-effectiveness of mobilizations and manipulations alone or in combination with other treatments.[215-219]

The guideline panel advises to only consider mobilization and/or manipulation as a supplement to exercise therapy because:

- the focus within the guideline is on an active approach;
- there is uncertainty about the specific effects of mobilization and/or manipulation; for instance, the evidence that the effects of singular mobilization and/or manipulation are clinically relevant compared to sham, placebo or no treatment is low to very low;
- mobilization and/or manipulation as a supplement to exercise therapy is aligned to an important degree with clinical practice, wherein mobilizations and manipulations are rarely applied as unimodal intervention, but rather usually in combination with exercises and advice;
- there is some evidence that patients are more satisfied with the treatment if mobilization and/or manipulation is

combined with exercises compared to mobilization and/or manipulation alone in patients with chronic neck pain;[220]

• this advice is in agreement with international guidelines, such as the NICE guideline on LBP and sciatica,[31] the Danish LBP or lumbar radiculopathy guideline,[85] and the Belgian national guideline on LBP and radicular pain.[86]

Additional considerations and remarks

There were no differences in treatment results between patients with short-term (<4 months) and persistent (>4 months) LBP. Therefore the guideline panel advises not to base the decision on whether or not to administer mobilizations and/or manipulations on the duration of the complaints, because evidence is lacking for this.

There was no evidence to make any recommendations for the use of mobilizations and/or manipulations in patients with LRS. However, patients with LRS have a greater chance of side effects, both serious and non-serious ones, such as considerable increase of pain and motor deficit compared to patients with LBP without LRS. Due to this, the guideline panel recommends preferably not administering mobilizations or manipulations on patients with LRS.

Manipulation appears to be more effective than mobilization on pain (small, not clinically relevant effect) and functionality (clinically relevant effect), both in the short and long term; however, the certainty of evidence is low to very low. Therefore, the guideline panel believes that the decision to mobilize or manipulate should be left to the specific expertise and assessment of the treating therapist.

Recent systematic reviews conclude that mobilization and/or manipulation may be cost-effective for patients with LBP.[215-219] However, Harper *et al.*[221] indicate that it is difficult to draw definitive conclusions due to the large variety of intervention methods and control interventions, the various perspectives based on which the costs were assessed (healthcare and/or social), the differences in outcome measures and the organization and financing of healthcare systems between the various countries.

There is uncertainty about the exact mechanism of action of mobilizations and manipulations.[222, 223] More in-depth research is desired on the mechanism of action, but also on the way in which and when mobilizations and/or manipulations are used in the overall treatment process.

It must be noted that this non-exercise therapy intervention is outside the competency profile of the exercise therapist (Cesar/Mensendieck), unless the exercise therapist has been trained in the additional competencies (Table XI).

Discussion

A multidisciplinary project group developed a clinical practice guideline for physical therapy in patients with LBP and LRS according to the national and international standards for guideline development. This guideline provides the physical therapist with evidence-based practical information and recommendations for use in daily clinical practice. This guideline replaces the former guidelines of the KNGF guideline on LBP[40] and the VvOCM guideline on non-specific low back complaints.[41]

Apart from updated evidence, the current guideline differs from the former KNGF[40] and VvOCM[41] guidelines in several respects. In order to make recommendations clinically applicable, the guideline addressed clinical questions that were based on prioritized barriers regarding the assessment and treatment of patients with LBP predefined by two focus groups. Evidence-to-decision forms were used to ensure that all criteria of relevance to a health decision were systematically considered when formulating the recommendations. With the evidence-to-decision forms the

Table XI.—*Recommendations mobilizations and manipulations.*

Profiles 1	• Do not perform mobilizations or manipulations
Profile 2 and 3	• Consider performing mobilizations and/or manipulations on patients with LBP, but only as a supplement to exercise therapy if the problem is mechanical in nature due to disorders within the neuromusculoskeletal system (*e.g.* decreased regional mobility during lumbar flexion or extension) • Evaluate and analyze the effects of mobilizations and/or manipulations immediately within the treatment session and at the start of the next session. Be alert to serious (rare) adverse effects, such as significant increase of pain or motor deficit • Discuss the choice of mobilization or manipulation with the patient and align with the patient's needs, preferences and capabilities and your own knowledge and skills as a therapist. When doing so, pay attention to potential negative effects and discuss this with the patient prior to the treatment
Do not perform mobilizations or manipulations: • as singular intervention • if you are not competent and authorized to do this or you have insufficient knowledge to determine the indication and contra-indications It is preferable not to perform mobilizations or manipulations on patients with LRS	

Mobilizations are understood to mean passive arthrogenic mobilizations. Manipulations are understood to mean high-velocity-thrust techniques on synovial joints.

considerations of many stakeholders were taken into account in all phases of the development process.

The scope of the current guideline was broadened with the assessment and management of LRS which is aligned with the NICE guideline on LBP and sciatica.[31] This addition is relevant as research suggests that recurrences often worsened over time,[224] and there is a possible continuum between pseudo-radicular pain and a typical LRS.[225] Patients with (radicular) sciatica into the leg for whom referral to the general practitioner is not necessary can be treated according to the current guideline. Situations where it is necessary to refer patients to the general practitioner or where supplementary recommendations apply are described. For example: "Be alert to emergency indications in patients with LRS, in the form of signs of a serious neurological problem," and "Check patients with LRS after two to four days and act according to the recommendations in this guideline."

In the 2013 KNGF LBP guideline non-specific LBP was defined as back pain (possibly with sciatica into the leg) for which no specific physical cause can be validly demonstrated. Specific LBP was defined as LBP with a specific physical cause that must be determined with additional diagnostics, such as a hernia of a lumbar disc (osteoporotic) spinal fractures, malignancy, ankylosing spondylitis, severe forms of canal stenosis or severe forms of spondylolisthesis.[40] LRS could point to specific LBP and therefore fell outside the scope of the 2013 KNGF guideline.

The guideline panel of the current guideline advises to use the term LBP instead of non-specific LBP. LBP includes the terms simple LBP, mechanical LBP, musculoskeletal LBP and non-specific LBP. The term LBP is used to include any LBP without signs that could indicate an underlying serious pathology like cancer, fracture, infection or an inflammatory disease process (alarm symptoms). Non-specific LBP was only used for the purposes of review questions in this guideline. Including guidance on the assessment and management of LRS might result in less intensive diagnostic evaluations, less fixation of the patient on his or her condition, and avoiding unnecessary costs for the health-care system.

In the current guideline risk of persistent complaints of LBP are decisive for the classification of patients into three treatment profiles. The 2013 KNGF guideline used also three treatment profiles but considered the course of LBP as a critical criterium. An abnormal course was defined as no significant increase in activities and participation in the first three weeks of LBP. Determining treatment profiles on the course of LBP has its limitations. An abnormal course can only be determined after some time has passed, meaning that a wait-and-see policy would have to be pursued in the beginning phase after the onset of complaints. The wait-and-see policy runs counter to the theoretical construct of the current guideline, where the emphasis is on identifying risk factors for delayed recovery. A wait-and-see policy can cause a delay in initiating the correct treatment for those with an increased risk of persistent complaints. Having said that, an abnormal course might be a reason to place greater emphasis on the search for a specific cause than at the patient's initial presentation or to reconsider the patient's treatment profile. An abnormal course of complaints is therefore designated within the current guideline as an indication for re-evaluating the risk of persistent complaints.

There is conflicting evidence for the duration of the complaints as a prognostic factor for persistent complaints of LBP.[226] Therefore, duration of complaints was not considered to be one of the factors to determine the treatment profile. The guideline considers LBP to be a long-lasting condition with a variable course rather than episodes of unrelated occurrences.[4] Consequently, risk of poor outcome at any time point is more important than the duration of complaints.[227, 228] The traditional duration-based classification of LBP (acute, sub-acute and chronic) in the 2013 KNGF guideline does not take into account the large variation in symptoms and pain courses that are reported by people with LBP nor discriminate clearly between chronic pain and relapsing LBP. Yet, the guideline panel believes that the duration of current and possible former complaints might be important patient characteristics that should be assessed during the medical history taking. Compared to short-term LBP, in patients with chronic pain there is a bigger chance that the experienced pain is the result of a complex interplay of physical, psychological and social factors. Chronic pain can cause permanent changes in the pain system, for example, including maladaptive neuroplastic changes in the somatosensory system (*e.g.* hyperactivity of the nociceptive system) and the pain memory (pain persists even though the cause has disappeared).[86]

Finally, compared to the 2013 KNGF guideline, this guideline provides more detailed information about the influence of psychosocial prognostic factors, and the delivery of behavior-oriented treatments with the focus on psychosocial factors (understanding pain, unhelpful thoughts, coping styles, and goal setting). This is in concordance with the advises of a recent Dutch qualitative study.[229] The guideline panel realizes that implementation of behavior-oriented treatments may be impeded by a lack

of knowledge about the possibilities of behavior-oriented programs among some clinicians,[230] the lack of skills to apply these treatment methods and the lack of full acceptance and integration of the biopsychosocial model in therapeutic actions.[230, 231] Although there is an increased attention and valuation of time-contingent treatment, motivational interviewing and coaching for behavioral change, the average physical therapist experience a lack of skills and confidence as a hindrance to successfully offering behavior-oriented treatments.[232, 233] To improve adherence to the guideline for behavior-oriented treatment, the implementation program provided education and support in behavior-oriented treatment skills and elements.

Strengths of the study

Strengths relate to the use of international standards for the development of rigorous, trustworthy guidelines. This included among others the involvement of many stakeholders, the elaboration of barriers regarding the assessment and treatment of patients with LBP and the use of evidence-to-decision forms.

The recommendations in the current guideline are in general in line with the recommendations of guidelines with a high methodological standard.[31, 85, 86] The NICE guideline on LBP and sciatica[31] with a high methodological standard served as a basis for the current guideline. Therefore several aspects are in accordance with this international guideline for LBP like inclusion of patients with LRS and the move away from the traditional duration-based classification of LBP and the uniform use of the term LBP instead of non-specific LBP. The NICE guideline did not consider papers published after December 15th, 2015, therefore a systematic search was carried out for recent systematic reviews and evidence-based guidelines for patients with LBP from January 1st, 2015 until April 14th, 2020. For the clinical questions about TENS, massage and mobilization/manipulation the project group carried out a systematic review itself.

The guideline panel presented three classification and treatment profiles in order to offer practicing physical therapists tools for guiding the therapy and facilitating the clinical decision-making process. The guideline panel believes that the risk of persistent LBP can play an important role here. Someone with short-term complaints may have an increased risk of persistent complaints, for which more intensive treatment is immediately indicated. Evaluation of the risk of persistent LBP can offer valuable information for the timely initiation of the correct treatment strategy.

In the developmental process, several knowledge gaps were identified. The guideline panel has formulated knowledge gaps on which scientific research can focus and these are published with the guideline.

Limitations of the study

The guideline panel is aware that there is still a lot of uncertainty about the extent to which prognostic factors can predict the risk of persistent LBP and the value for the individual patient. For example, factors can have different influences at different points across the life course.[33] Besides, little may be added by measuring factors with substantial overlap, such as bad relationships with colleagues and diminished job satisfaction.[33] However, the guideline panel assumes that if a factor or a combination of factors is dominant, this impedes the chance of recovery. Psychosocial prognostic factors play an important role in the classification into treatment profiles. If psychosocial prognostic factors are dominant in the therapist's estimation and have a sustained and negative impact on movement-related functioning, the patient is assigned to treatment profile 3. In such cases, behavior-oriented treatment is considered. The classification into treatment profiles, which in its current form is based on the individual evaluation by the physical therapist, requires further development. The treatment profiles are only based on recovery-impeding factors, because of a lack of information about important recovery-promoting prognostic factors. However these latter factors are also important to cope autonomously with life's ever changing physical, emotional, and social challenges.[234] Besides, these factors can also support clinicians in their daily communication with patients as it focuses on empowerment of the patient.

A limitation of the methodology is that for the physical therapist interventions, we limited evidence to published guidelines, systematic reviews or meta-analyses and RCTs. We did not systematically search for other, non-controlled trials or observational studies.

Implementation program

With regard to phase 4 of the method of guideline development, dissemination and implementation of the guideline in daily practice is important. Therefore, an extensive implementation program consisting of lectures and training courses has been executed to increase the physical therapists knowledge of evidence-based treatment and information. Implementation of the guideline entails development of the following products: patient information, lectures, workshops, e-learning, knowledge gaps, articles in magazines (both within and outside the fields of physical thera-

py and exercise), and lectures at congresses and symposia. The Dutch Association of Back Patients 'the Spine' was involved in the development of the patient information.

Implementation activities are aimed in particular at the following five core topics: 1. prognostic factors and treatment profiles; 2. LRS, diagnostics and treatment; 3. Information and advice and pain education, contents of the information and advice; 4. exercise therapy interventions; 5. behavior-oriented treatment.

Given scientific developments, maintaining an up-to-date guideline is important. Therefore, the project group will update the guideline when new questions arise in practice or new evidence appears that necessitate a revision. The guideline consists of stand-alone modules. A module consists of the elaboration of one or a few clinical questions. Revisions can be conducted efficiently in the future through updating separate modules. The appearance of new questions and scientific publications are monitored conscientiously by the KNGF policy advisors, guideline experts, and scientific researchers.

Conclusions

In conclusion, this newly updated guideline based on scientific evidence and expert consensus provides more detail regarding the assessment and treatment of patients with LBP and LRS. Three classification and treatment profiles are presented based on risk factors of persistent LBP and LRS. To improve the quality of care for these patients, adequate dissemination, implementation, and timely updates are needed.

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