

Rating scales for low back pain

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Introduction: During the past decades several rating scales have been developed to assess the functional status of patients with low back pain.

Methods: We performed a search using the keywords 'spine' in combination with 'scoring system', 'scale', 'scores', 'outcome assessment', 'low back pain' and 'clinical evaluation'.

Results: Twenty-eight scoring systems are currently available for the evaluation of low back pain. Each of them evaluates low back pain using specific variables. All these scoring systems are presented.

Discussion: Although many scoring systems have been used to evaluate the back function, we are still far from a single outcome evaluation system that is reliable, valid and sensitive to clinically relevant changes, taken into account both patients' and physicians' perspective and is short and practical to use.

Conclusion: Further studies are required to evaluate the reliability, validity and sensitivity of the low back pain scoring systems used in the common clinical practice.

Keywords: low back pain/rating scores/assessment

Introduction

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Low back pain (LBP) is a common symptom, affecting more than 80% of the general population in the industrialized world.¹ It is the most frequent cause of disability in people under 45 years of age.² It represents a relevant social and economic problem in developed countries, being the first reason for orthopaedic consultations.³

The development of instruments to measure the outcome of patient with LBP has been the subject of increasing interest. During the past decades, several score systems have been developed to assess the functional status of patients with LBP.⁴⁻⁷ Many generic and disease-specific measures are available for orthopaedic clinical and research practice.⁸

Self-report questionnaires of pain and functional status allow one to evaluate patients before and after a given treatment, and they can be used to detect short-term or long-term clinical changes of symptoms and disabilities.⁹

The aim of this review is to report all the available score systems for the evaluation of LBP and their use in the current orthopaedic practice.

Materials and methods

We performed a search using the keywords ‘spine’ in combination with ‘scoring system’, ‘scale’, ‘scores’, ‘outcome assessment’, ‘low back pain’ and ‘clinical evaluation’, with no limit regarding the year of publication. The following databases were accessed on 20 February 2009: PubMed (<http://www.ncbi.nlm.nih.gov/sites/entrez/>); Ovid (<http://www.ovid.com>); Cochrane Reviews (<http://www.cochrane.org/reviews/>). Given the linguistic capabilities of the research team, we considered publications in English, Spanish and Italian. Two authors (U.G.L. and M.L.) independently read the abstract of each publication identified (if an abstract was available). If no abstract was available, the publication was excluded. In addition, the references section of all the publications identified were studied to ascertain whether other relevant material could be found. The personal collection of scientific material of the senior authors (N.M. and V.D.) was consulted for the same purpose. If deemed relevant, all relevant publications were retrieved. The most relevant material was drawn between the years 1990 and 2007. A large number of publications focusing on surgical techniques of the lumbar spine, not including outcome scores, were not included. The publications thus selected were examined by all authors. After this further selection, 94 publications relevant to the topic at hand were included (Fig. 1).

Analytical description of LBP scoring systems

Roland–Morris disability questionnaire

The Roland–Morris disability questionnaire¹⁰ is constructed by choosing statements from the sickness impact profile (SIP), which is a 136-item health status measure covering a range of aspects of daily living about physical and mental function.^{11,12} The scale consists of 24 yes/no items related specifically to physical functions to specifically assess the disability from LBP (Table 1). The physical functions considered include walking, bending over, sitting, lying down, dressing,

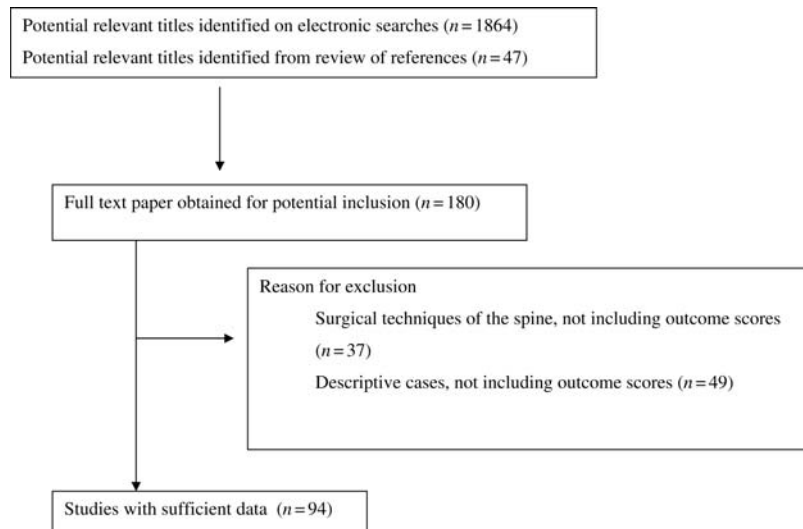


Fig. 1 Details of the investigations excluded and included in the study.

sleeping, self-care and daily activities. Patients are asked whether the statements apply to them that day (i.e. the last 24 h). In the scale, one point is given for each item. The RDQ score can be obtained by adding up the number of items checked. The final score ranges from 0 (no disability) to 24 (severe disability). The questionnaire is self-administered by the patient, it can be completed in a maximum of 5 min, and an un-weighted score can be calculated in less than 1 min.

The original RDQ also contains a six-point pain rating scale in the form of a pain thermometer.¹⁰ However, the authors prefer to use the pain scale of SF-36 instead of scale described in the original article.¹³

Variants of Roland–Morris disability questionnaire

The RDQ-23⁷ (Table 2) is a modified 23-item version of Roland–Morris disability scale. In this instrument five original items are deleted and replaced with other four items which the authors selected from the SIP. The five deleted items are ‘Because of my back, I lie down to rest more often’, ‘Because of my back, I try to get other people to do things for me’, ‘My appetite is not very good because of my back’, ‘Because of my back pain, I get dressed with help from someone else’ and ‘I sit down for most of the day because of my back’. Each item is scored with 0 or 1 point and the final score is obtained by adding up item scores, ranging from 0 to 23.

The RDQ-18¹⁴ (Table 3) is a shorter modified version of Roland–Morris disability scale, in which items 2, 15, 17, 19, 20 and 24 are

Table 1 The Roland–Morris disability questionnaire.

Roland–Morris disability questionnaire	
When your back hurts, you may find it difficult to do some things you normally do. This list contains sentences that people have used to describe themselves when they have back pain. When you read them, you may find that some stand out because they describe you today. As you read the list, think of yourself today. When you read a sentence that describes you today, put a tick against it. If the sentence does not describe you, then leave the space blank and go on to the next one. Remember, only tick the sentence if you are sure it describes you today.	
	Yes No
1. I stay at home most of the time because of my back.	
2. I change position frequently to try and get my back comfortable.	
3. I walk more slowly than usual because of my back.	
4. Because of my back I am not doing any of the jobs that I usually do around the house.	
5. Because of my back, I use a handrail to get upstairs.	
6. Because of my back, I lie down to rest more often.	
7. Because of my back, I have to hold on to something to get out of an easy chair.	
8. Because of my back, I try to get other people to do things for me.	
9. I get dressed more slowly than usual because of my back.	
10. I only stand for short periods of time because of my back.	
11. Because of my back, I try not to bend or kneel down.	
12. I find it difficult to get out of a chair because of my back.	
13. My back is painful almost all the time.	
14. I find it difficult to turn over in bed because of my back.	
15. My appetite is not very good because of my back pain.	
16. I have trouble putting on my socks (or stockings) because of the pain in my back.	
17. I only walk short distances because of my back.	
18. I sleep less well on my back.	
19. Because of my back pain, I get dressed with help from someone else.	
20. I sit down for most of the day because of my back.	
21. I avoid heavy jobs around the house because of my back.	
22. Because of my back pain, I am more irritable and bad tempered with people than usual.	
23. Because of my back, I go upstairs more slowly than usual.	
24. I stay in bed most of the time because of my back.	

deleted. The other questions are the same of original questions. Item reduction is obtained by measuring the frequency of item endorsement, calculating the inter-item correlations and determining the internal consistency of the questionnaire. The original version scoring scheme is maintained.

The RDQ-16^{15,16} (Table 4) is a modified 16-item Roland–Morris disability scale designed to measure the limitations in daily living in the past 2 weeks due to back pain. Each item can be answered as follows: ‘yes’, ‘no’, ‘don’t know’ or ‘not applicable’. For scoring, the number of affirmative answers is divided by the number of questions answered. The final score is expressed by the percentage of items checked with higher scores representing greater limitations.

The RDQ-two time version (RDQ-two)¹⁷ (Table 5) is a modified version of Roland–Morris disability scale produced to assess the LBP

Table 2 The Roland–Morris disability questionnaire 23-item version.

Roland–Morris disability questionnaire 23-item version	
When your back or leg hurts, you may find it difficult to do some things you normally do. This list contains sentences that people have used to describe themselves when they have back pain or sciatica. When you read them, you may find that some stand out because they describe you today. As you read the list, think of yourself today. When you read a sentence that describes you today, put a check in the 'yes' column. If the sentence does not describe you today, you check the 'no' column.	
	Yes No
1. I stay at home most of the time because of my back problem or leg pain (sciatica).	
2. I change position frequently to try to get my back or leg comfortable.	
3. I walk more slowly than usual because of my back problem or leg pain (sciatica).	
4. Because of my back problem, I am not doing any of the jobs that I usually do around the house.	
5. Because of my back problem, I use a handrail to get upstairs.	
6. Because of my back problem, I have to hold on to something to get out of an easy chair.	
7. I get dressed more slowly than usual because of my back problem or leg pain (sciatica).	
8. I only stand for short periods of time because of my back problem or leg pain (sciatica).	
9. Because of my back problem, I try not to bend or kneel down.	
10. I find it difficult to get out of a chair because of my back problem or leg pain (sciatica).	
11. My back or leg is painful almost all the time.	
12. I find it difficult to turn over in bed because of my back problem or leg pain (sciatica).	
13. I have trouble putting on my socks (or stockings) because of the pain in my back or leg.	
14. I only walk short distances because of my back problem or leg pain (sciatica).	
15. I sleep less well because of my back problem.	
16. I avoid heavy jobs around the house because of my back problem.	
17. Because of my back problem, I am more irritable and bad tempered with people than usual.	
18. Because of my back problem, I go upstairs more slowly than usual.	
19. I stay in bed most of the time because of my back or leg pain (sciatica).	
20. Because of my back problem, my sexual activity is decreased.	
21. I keep rubbing or holding areas of my body that hurt or are uncomfortable.	
22. Because of my back problem, I am doing less of the daily work around the house than I would usually do.	
23. I often express concern to other people over what might be happening to my health.	

over the preceding 4 weeks. Patients have to mark how many days in the previous 4 weeks they had been affected by LBP. Each question has different possible answers and is scored with a 4-week time scale, ranging from 0 to 1 and according to how many days patient is affected: 'not at all' or 'not applicable' are scored with 0 points; '1–7 days' is scored with 0.2 points; '8–14 days' is scored with 0.4 points; '15–21 days' is scored with 0.6 points; '21–27 days' is scored with 0.8 points and 'every day' is scored with 1 point. The number of questions and the domains investigated are the same of the original version. The final score is calculated by dividing the patient total score by the maximum possible score (24) to express the result as a percentage.

The RDQ-7p¹⁸ (Table 6) is a modified version of Roland–Morris disability scale in which a seven point Likert scale is used. This version consists of original wording and original scheme. For scoring, yes/no responses are replaced with a seven-point scale, ranging from 0

Table 3 The Roland–Morris disability questionnaire 18-item version.

Roland–Morris disability questionnaire 18-item version

When your back hurts, you may find it difficult to do some things you normally do. This list contains sentences that people have used to describe themselves when they have back pain. When you read them, you may find that some stand out because they describe you today. As you read the list, think of yourself today. When you read a sentence that describes you today, put a tick against it. If the sentence does not describe you, then leave the space blank and go on to the next one. Remember, only tick the sentence if you are sure it describes you today.

	Yes	No
1. I stay at home most of the time because of my back.		
2. I walk more slowly than usual because of my back.		
3. Because of my back I am not doing any of the jobs that I usually do around the house.		
4. Because of my back, I use a handrail to get upstairs.		
5. Because of my back, I lie down to rest more often.		
6. Because of my back, I have to hold on to something to get out of an easy chair.		
7. Because of my back, I try to get other people to do things for me.		
8. I get dressed more slowly than usual because of my back.		
9. I only stand for short periods of time because of my back.		
10. Because of my back, I try not to bend or kneel down.		
11. I find it difficult to get out of a chair because of my back.		
12. My back is painful almost all the time.		
13. I find it difficult to turn over in bed because of my back.		
14. I have trouble putting on my socks (or stockings) because of the pain in my back.		
15. I sleep less well on my back.		
16. I avoid heavy jobs around the house because of my back.		
17. Because of my back pain, I am more irritable and bad tempered with people than usual.		
18. Because of my back, I go upstairs more slowly than usual.		

Table 4 The modified 16-item Roland–Morris scale.

Modified 16-Item Roland–Morris scale

In the past 2 weeks, because of past or present back pain have you ...

	Yes	No	DK	NA
1. Stayed in bed more?				
2. Done less of the jobs you usually do around the house?				
3. Avoided heavy jobs around the house?				
4. Laid down to rest more often?				
5. Kept rubbing or holding areas of your body that hurt or are uncomfortable?				
6. Shown less affection?				
7. Been more irritable and bad tempered with people than usual?				
8. Done fewer social activities with groups of people?				
9. Talked less with those around you?				
10. Asked people to do things for you?				
11. Not kept your attention on any activity for long?				
12. Not finished things you start?				
13. Had difficulty eating?				
14. Accomplished less than usual at work? (if NA, skip to item 16)				
15. Taken frequent rest when you work?				
16. Gone out for entertainment less often?				

DK: don't know; NA: not applicable.

Note: When less than six answers are missing, the number of 'yes' answers is divided by the number of answered items.

Table 5 The Roland–Morris disability questionnaire two.

Roland–Morris disability questionnaire two	Not at all	1–7 days	8–14 days	15–21 days	22–27 days	Every day	NA
I have stayed at home because of my back.							
When sitting for long periods I have needed to change position frequently to try and get of my back comfortable.							
I have had to walk more slowly than usual because of my back.							
My back has prevented me doing any of my usual jobs around the house.							
Because of my back, I have needed to use the handrail to go up stairs.							
Because of my back, I have needed to lie down to rest more than usual.							
Because of my back, I have needed to hold on to something to get out of an easy chair.							
Because of my back, I had to try to get other people to do things for me.							
Because of my back, I have needed to get dressed more slowly than usual.							
Because of my back, I have only been able to stand for short periods.							
Because of my back, I have tried not to bend or kneel down.							
I have found it difficult to get out of a chair because of my back.							
My back has been painful.							
I have found it difficult to turn over in bed because of my back.							
My appetite has not been very good because of my back pain.							
I have had trouble putting on my socks, tights or stockings because of pain in my back.							
I have only been able to walk short distances because of my back pain.							
I have slept less well because of my back.							
Because of my back pain, I have needed help to get dressed.							
I have needed to sit down most of the day because of my back.							

Continued

Table 5 Continued

Roland–Morris disability questionnaire two							
	Not at all	1–7 days	8–14 days	15–21 days	22–27 days	Every day	NA
I avoided heavy jobs around the house because of my back.							
Because of my back pain, I have been more irritable and bad tempered with people than usual.							
Because of my back, I have gone up stairs more slowly than usual.							
I have stayed in bed most of the day because of my back.							
NA, not applicable.							

to 6. The scale is labelled as follows: 0 points means ‘disagree totally’, 3 points means ‘not sure’ and 6 means ‘agree totally’. The final questionnaire score is expressed as percentages of the total possible score with higher scores representing greater disability.

The RDQ-12 (Table 7), also named the Maine–Seattle back questionnaire, is a 12-item version of Roland–Morris disability scale derived from the RDQ-23.¹⁹ It is a short self-administered back-specific questionnaire. Like the original scale, the final score is obtained with an unweighted sum of each item score. Thus, the RDQ-12 score can range from 0 (no impairment) to 12 (severe impairment).

Oswestry disability index

The original Oswestry disability index (ODI) (version 1.0)²⁰ (Table 8) includes 10 sections of questions that evaluate the activities of daily living, which can be drastically influenced by LBP. The sections have been selected from experimental questionnaires that aimed to assess several aspects of daily living. The ODI domains are the following: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life and travelling. Each section contains six statements that are scored from 0 (minimum degree of difficulty in that activity) to 5 (maximum degree of difficulty). If more than one statement is marked in each section, the highest score should be taken. The total score is obtained by summing up the scores of all sections, giving a maximum of 50 points. The final score is expressed as a percentage with the following formula: $(\text{total score}/(5 \times \text{number of questions answered})) \times 100\%$. For example, if all 10 sections are completed the score is calculated as

Table 6 The Roland–Morris disability questionnaire 7p.

Roland–Morris disability questionnaire 7p

When your back hurts, you may find it difficult to do some things you normally do. This list contains sentences that people have used to describe themselves when they have back pain. When you read them, you may find that some stand out because they describe you today. As you read the list, think of yourself today. When you read a sentence that describes you today, put a tick against it. If the sentence does not describe you, then leave the space blank and go on to the next one. Remember, only tick the sentence if you are sure it describes you today.

	0	1	2	3	4	5	6
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
24.							

Table 7 The Roland–Morris disability questionnaire 12-item version.

Roland–Morris disability questionnaire 12-item version

When your back or leg hurts, you may find it difficult to do some things you normally do. This list contains sentences that people have used to describe themselves when they have back pain or sciatica. When you read them, you may find that some stand out because they describe you today. As you read the list, think of yourself today. When you read a sentence that describes you today, put a check in the 'yes' column. If the sentence does not describe you today, you check the 'no' column.

	Yes	No
1. I change position frequently to try to get my back or leg comfortable.		
2. Because of my back problem, I use a handrail to get upstairs.		
3. I get dressed more slowly than usual because of my back problem or leg pain (sciatica).		
4. I only stand for short periods of time because of my back problem or leg pain (sciatica).		
5. Because of my back problem, I try not to bend or kneel down.		
6. I find it difficult to get out of a chair because of my back problem or leg pain (sciatica).		
7. My back or leg is painful almost all the time.		
8. I sleep less well because of my back problem.		
9. I stay in bed most of the time because of my back or leg pain (sciatica).		
10. Because of my back problem, my sexual activity is decreased.		
11. I keep rubbing or holding areas of my body that hurt or are uncomfortable.		
12. Because of my back problem, I am doing less of the daily work around the house than I would usually do.		

Table 8 The Oswestry disability index (version 1.0).

Oswestry disability index (version 1.0)

The questionnaire has been designed to give the doctor information as to how your back pain has affected your ability to manage in every day life. Please answer every section, and mark in each section only the one box which applies to you. We realize you may consider that two of the statements in any one section relate to you, but please just mark the box which most closely describes your problem.

Section 1: Pain intensity

1. I can tolerate the pain I have without having to use painkillers.
2. The pain is bad but I manage without taking painkillers.
3. Painkillers give complete relief from pain.
4. Painkillers give moderate relief from pain.
5. Painkillers give very little relief from pain.
6. Painkillers have no effect on the pain and I do not use them.

Section 2: Personal care (washing, dressing, etc.)

1. I can look after myself normally without causing extra pain.
2. I can look after myself normally but it causes extra pain.
3. It is painful to look after myself and I am slow and careful.
4. I need some help but I manage most of my personal care.
5. I need help every day in most aspects of self-care.
6. I do not get dressed, wash with difficulty and stay in bed.

Section 3: Lifting

1. I can lift heavy weights without extra pain.
2. I can lift heavy weights but it gives extra pain.
3. Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned (e.g. on a table).

Continued

Table 8 Continued

Oswestry disability index (version 1.0)

4. Pain prevents me from lifting heavy weights, but I can manage light-to-medium weights if they are conveniently positioned.
5. I can lift only very light weights.
6. I cannot lift or carry anything at all.

Section 4: Walking

1. Pain does not prevent my walking any distance.
2. Pain prevents me walking more than 1 mile.
3. Pain prevents me walking more than 1/2 mile.
4. Pain prevents me walking more than 1/4 mile.
5. I can only walk using a stick or crutches.
6. I am in bed most of the time and have to crawl to the toilet.

Section 5: Sitting

1. I can sit in any chair as long as I like.
2. I can sit in my favourite chair as long as I like.
3. Pain prevents me sitting more than 1 h.
4. Pain prevents me from sitting more than 1/2 an hour.
5. Pain prevents me from sitting more than 10 min.
6. Pain prevents me from sitting at all.

Section 6: Standing

1. I can stand as long as I want without extra pain.
2. I can stand as long as I want but it gives me extra pain.
3. Pain prevents me from standing for more than 1 h.
4. Pain prevents me from standing for more than 30 min.
5. Pain prevents me from standing for more than 10 min.
6. Pain prevents me from standing at all.

Section 7: Sleeping

1. Pain does not prevent me from sleeping well.
2. I can sleep well only by using tablets.
3. Even when I take tablets I have less than 6 h sleep.
4. Even when I take tablets I have less than 4 h sleep.
5. Even when I take tablets I have less than 2 h sleep.
6. Pain prevents me from sleeping at all.

Section 8: Sex life

1. My sex life is normal and causes no extra pain.
2. My sex life is normal but causes some extra pain.
3. My sex life is nearly normal but is very painful.
4. My sex life is severely restricted by pain.
5. My sex life is nearly absent because of pain.
6. Pain prevents any sex life at all.

Section 9: Social life

1. My social life is normal and gives me no extra pain.
2. My social life is normal but increases the degree of pain.
3. Pain has no significant effect on my social life apart from limiting my more energetic interests (e.g. dancing, etc.).
4. Pain has restricted my social life and I do not go out as often.
5. Pain has restricted social life to my home.
6. I have no social life because of pain.

Continued

Table 8 Continued

Oswestry disability index (version 1.0)

Section 10: Travelling

1. I can travel anywhere without extra pain.
2. I can travel anywhere but it gives me extra pain.
3. Pain is bad but I manage journeys over 2 h.
4. Pain restricts me to journeys of less than 1 h.
5. Pain restricts me to short necessary journeys under 30 min.
6. Pain prevents travel except to the doctor or hospital.

follows: $16 \text{ (total scored)}/50 \text{ (total possible score)} \times 100 = 32\%$. If one section is missed (or not applicable) the score is calculated as follows: $16 \text{ (total scored)}/45 \text{ (total possible score)} \times 100 = 35.5\%$.²¹

The authors suggest rounding the percentage to a whole number for convenience. The higher the percentage, the greater the perceived level of disability by the patient. The total score ranges from 0 to 100%, with 0 representing no disability and 100 representing maximum disability. A total score between 0 and 20% means minimal disability; between 20 and 40%, moderate disability; between 40 and 60%, severe disability; between 60 and 80%, crippled; between 80 and 100%, bed bound or symptom magnifier.²⁰

The questionnaire is self-administered by the patient, it is usually completed in less than 5 min and scored in less than 1 min.

Versions of the ODI

Several versions of the ODI are available.²¹ The original version 1.0²⁰ was published without section 8 (sex life) or section 9 (social life).²² Moreover, there are two studies, in which the administration of the ODI by telephone has been reported.^{23,24}

The Medical Research Council group produced a modified version of the ODI (version 2.0)²⁵ (Table 9), which has been proposed for general use.^{26–28} It has been distributed by correspondence and is available as part of a computer interview in the UK (slightly modified)^{25,29} or in the USA through MODEMS (PO Box 2354, Des Plaines, IL 60017-2354). In this version the following domains are included: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life (if applicable), social life and travelling. Each section contains six statements, ranging from 0 to 5, and patients should answer the questions in relation to that day ('today'). The standard scoring method can be used to obtain the final disability score.^{20,21}

A revised Oswestry Disability Questionnaire (Table 10) was published by a chiropractic study group in the UK.³⁰ This version consists

Table 9 The Oswestry disability index (version 2.0).

Oswestry disability index (version 2.0)

Could you please complete this questionnaire. It is designed to give us information as to how your back (or leg) trouble has affected your ability to manage in everyday life. Please answer every section. Mark one box only in each section that most closely describes you today.

Section 1: Pain intensity

1. I have no pain at the moment.
2. The pain is very mild at the moment.
3. The pain is moderate at the moment.
4. The pain is fairly severe at the moment.
5. The pain is very severe at the moment.
6. The pain is the worst imaginable at the moment.

Section 2: Personal care (washing, dressing, etc.)

1. I can look after myself normally without causing extra pain.
2. I can look after myself normally but it is very painful.
3. It is painful to look after myself and I am slow and careful.
4. I need some help but I manage most of my personal care.
5. I need help every day in most aspects of self-care.
6. I do not get dressed, wash with difficulty and stay in bed.

Section 3: Lifting

1. I can lift heavy weights without extra pain.
2. I can lift heavy weights but it gives extra pain.
3. Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned (e.g. on a table).
4. Pain prevents me from lifting heavy weights, but I can manage light-to-medium weights if they are conveniently positioned.
5. I can lift only very light weights.
6. I cannot lift or carry anything at all.

Section 4: Walking

1. Pain does not prevent me walking any distance.
2. Pain prevents me walking more than 1 mile.
3. Pain prevents me walking more than a quarter of a mile.
4. Pain prevents me walking more than 100 yards.
5. I can only walk using a stick or crutches.
6. I am in bed most of the time and have to crawl to the toilet.

Section 5: Sitting

1. I can sit in any chair as long as I like.
2. I can sit in my favourite chair as long as I like.
3. Pain prevents me sitting more than 1 h.
4. Pain prevents me from sitting more than half an hour.
5. Pain prevents me from sitting more than 10 min.
6. Pain prevents me from sitting at all.

Section 6: Standing

1. I can stand as long as I want without extra pain.
2. I can stand as long as I want but it gives me extra pain.
3. Pain prevents me from standing for more than 1 h.
4. Pain prevents me from standing for more than half an hour.
5. Pain prevents me from standing for more than 10 min.
6. Pain prevents me from standing at all.

Continued

Table 9 *Continued*

Oswestry disability index (version 2.0)

Section 7: Sleeping

1. My sleep is never disturbed by pain.
2. My sleep is occasionally disturbed by pain.
3. Because of pain I have less than 6 h sleep.
4. Because of pain I have less than 4 h sleep.
5. Because of pain I have less than 2 h sleep.
6. Pain prevents me from sleeping at all.

Section 8: Sex life (if applicable)

1. My sex life is normal and causes no extra pain.
2. My sex life is normal but causes some extra pain.
3. My sex life is nearly normal but is very painful.
4. My sex life is severely restricted by pain.
5. My sex life is nearly absent because of pain.
6. Pain prevents any sex life at all.

Section 9: Social life

1. My social life is normal and causes me no extra pain.
2. My social life is normal but increases the degree of pain.
3. Pain has no significant effect on my social life apart from limiting my more energetic interests (e.g. sport, etc.).
4. Pain has restricted my social life and I do not go out as often.
5. Pain has restricted social life to my home.
6. I have no social life because of pain.

Section 10: Travelling

1. I can travel anywhere without pain.
2. I can travel anywhere but it gives me extra pain.
3. Pain is bad but I manage journeys over 2 h.
4. Pain restricts me to journeys of less than 1 h.
5. Pain restricts me to short necessary journeys under 30 min.
6. Pain prevents me from travelling except to receive treatment.

of 10 sections: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, travelling and changing degree of pain. Also in this version each section contains six statements, ranging from 0 to 5, and the final score is calculated with standard scoring method.

A modified ODI published by Fritz and Irrgang³¹ (Table 11) is similar to the modified ODI used by Hudson-Cook *et al.*³⁰ The questionnaire consists of 10 domains: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, travelling and employment/home-making. A section regarding employment and home-making ability is substituted for the section related to sex life. Each domain contains six statements, scored from 0 to 5, with higher values representing greater disability. The final score is obtained with standard scoring method.

The American Academy of Orthopaedic Surgeons (AAOS) and other spine societies have modified version 1.0 to use it like their spine outcome instrument³² (Table 12). This version includes seven sections: personal care, lifting, walking, sitting, standing, sleeping and travelling.

Table 10 The revised Oswestry disability index.

Revised Oswestry disability index

This questionnaire is designed to enable us to understand how much your low back pain has affected your ability to manage your everyday activities. Mark one box only in each section that most closely describes you today.

Section 1: Pain intensity

1. The pain comes and goes and is very mild.
2. The pain is mild and does not very much.
3. The pain comes and goes and is moderate.
4. The pain is moderate and does not very much.
5. The pain comes and goes and is severe.
6. The pain is severe and does not very much.

Section 2: Personal care

1. I would not have to change my way of washing or dressing in order to avoid pain.
2. I do not normally change my way of washing or dressing even though it causes some pain.
3. Washing and dressing increase the pain but I manage not to change my way of doing it.
4. Washing and dressing increase the pain and I find it necessary to change my way of doing it.
5. Because of the pain I am unable to do some washing and dressing without help.
6. Because of the pain I am unable to do any washing and dressing without help.

Section 3: Lifting

1. I can lift heavy weights without extra pain.
2. I can lift heavy weights but it gives extra pain.
3. Pain prevents me from lifting heavy weights off the floor.
4. Pain prevents me from lifting heavy weights off the floor but I can manage if they are conveniently positioned, e.g. on a table.
5. Pain prevents me from lifting heavy weights but I can manage light-to-medium weights if they are conveniently positioned
6. I can only lift very light weights at the most.

Section 4: Walking

1. I have no pain on walking.
2. I have some pain with walking but it does not increase with distance.
3. I cannot walk more than 1 mile without increasing pain.
4. I cannot walk more than 1/2 mile without increasing pain.
5. I cannot walk more than 1/4 mile without increasing pain.
6. I cannot walk at all without increasing pain.

Section 5: Sitting

1. I can sit in any chair as long as I like.
2. I can sit only in my favourite chair as long as I like.
3. Pain prevents me from sitting more than 1 h.
4. Pain prevents me from sitting more than half an hour.
5. Pain prevents me from sitting more than 10 min.
6. I avoid sitting because it increases pain straight away.

Section 6: Standing

1. I can stand as long as I want without pain.
2. I have some pain on standing but it does not increase with time.
3. I cannot stand for longer than 1 h without increasing pain.
4. I cannot stand for longer than half an hour without increasing pain.
5. I cannot stand for longer than 10 min without increasing pain.
6. I avoid standing because it increases pain straight away.

Continued

Table 10 Continued

Revised Oswestry disability index

Section 7: Sleeping

1. I get no pain in bed.
2. I get pain in bed but it does not prevent me from sleeping well.
3. Because of pain my normal nights sleep is reduced by less than 1/4.
4. Because of pain my normal nights sleep is reduced by less than 1/2.
5. Because of pain my normal nights sleep is reduced by less than 3/4.
6. Pain prevents (me) from sleeping at all.

Section 8: Social life

1. My social life is normal and gives me no pain.
2. My social life is normal but increases the degree of pain.
3. Pain has no significant effect on my social life apart from limiting my more energetic interests (e.g. dancing, etc.).
4. Pain has restricted my social life and I do not go out very often.
5. Pain has restricted social life to my home.
6. I have hardly any social life because of pain.

Section 9: Travelling

1. I get no pain whilst travelling.
2. I get some pain whilst travelling but none of my usual sorts of travel make it any worse.
3. I get extra pain whilst travelling but it does not compel me to seek alternative forms of travel.
4. I get extra pain whilst travelling which compels me to seek alternative forms of travel.
5. Pain restricts all forms of travel.
6. Pain prevents all forms of travel except that done lying down.

Section 10: Changing degree of pain

1. My pain is rapidly getting better.
2. My pain fluctuates but overall is definitely getting better.
3. My pain seems to be getting better but improvement is slow at present.
4. My pain is neither getting better or worse.
5. My pain is gradually worsening.
6. My pain is rapidly worsening.

The sections 1, 8 and 9 are omitted. Each section contains six statements, ranging from 0 to 5, and patients should answer the questions in relation to 'the past week'.¹³ The standard scoring method can be also used for this versions of the ODI, but because it has only seven sections, corrections should be made to obtain the final score.²¹

Another version of the ODI has been published by the North American Spine Society (NASS).³³ This version includes a pain diagram, questions from the SF-36 health questionnaire, questions on neurological symptoms and on the LBP, and a modification of the original ODI.¹³

The Quebec back pain disability scale

The Quebec back pain disability scale (QBPDS) (Table 13) is a 20-item condition-specific questionnaire to assess the degree of disability in patient with back pain.³⁴ Item selection was performed from 46

Table 11 The modified Oswestry disability index.

Modified Oswestry disability index

This questionnaire has been designed to give your therapist information as to how your back pain has affected your ability to manage in everyday life. Please answer every question by placing a mark in the one box that best describes your condition today. We realize you may feel that two of the statements may describe your condition, but please mark only the box that most closely describes your current condition.

Section 1: Pain intensity

1. I can tolerate the pain I have without having to use pain medication.
2. The pain is bad, but I can manage without having to take pain medication.
3. Pain medication provides me with complete relief from pain.
4. Pain medication provides me with moderate relief from pain.
5. Pain medication provides me with little relief from pain.
6. Pain medication has no effect on my pain.

Section 2: Personal care (e.g. washing, dressing)

1. I can take care of myself normally without causing increased pain.
2. I can take care of myself normally, but it increases my pain.
3. It is painful to take care of myself, and I am slow and careful.
4. I need help, but I am able to manage most of my personal care.
5. I need help every day in most aspects of my care.
6. I do not get dressed, wash with difficulty, and stay in bed. I can sleep well only by using pain medication.

Section 3: Lifting

1. I can lift heavy weights without increased pain.
2. I can lift heavy weights, but it causes increased pain.
3. Pain prevents me from lifting heavy weights off the floor, but I can manage if the weights are conveniently positioned (e.g. on a table).
4. Pain prevents me from lifting heavy weights, but I can manage light-to-medium weights if they are conveniently positioned.
5. I can lift only very light weights.
6. I cannot lift or carry anything at all. My social life is normal and does not increase my pain.

Section 4: Walking

1. Pain does not prevent me from walking any distance.
2. Pain prevents me from walking more than 1 mile.
3. Pain prevents me from walking more than 1/2 mile.
4. Pain prevents me from walking more than 1/4 mile.
5. I can only walk with crutches or a cane.
6. I am in bed most of the time and have to crawl to the toilet.

Section 5: Sitting

1. I can sit in any chair as long as I like.
2. I can sit only in my favourite chair as long as I like.
3. Pain prevents me from sitting more than 1 h.
4. Pain prevents me from sitting more than 1/2 h.
5. Pain prevents me from sitting more than 10 min.
6. Pain prevents me from sitting at all.

Section 6: Standing

1. I can stand as long as I want without increased pain.
2. I can stand as long as I want, but it increases my pain.
3. Pain prevents me from standing more than 1 h.
4. Pain prevents me from standing more than 1/2 h.
5. Pain prevents me from standing more than 10 min.
6. Pain prevents me from standing at all.

Continued

Table 11 *Continued*

Modified Oswestry disability index

Section 7: Sleeping

1. Pain does not prevent me from sleeping well.
2. I can sleep well only by using pain medication.
3. Even when I take pain medication, I sleep less than 6 h.
4. Even when I take pain medication, I sleep less than 4 h.
5. Even when I take pain medication, I sleep less than 2 h.
6. Pain prevents me from sleeping at all.

Section 8: Social life

1. My social life is normal and does not increase my pain.
2. My social life is normal, but it increases my level of pain.
3. Pain prevents me from participating in more energetic activities (e.g. sports, dancing).
4. Pain prevents me from going out very often.
5. Pain has restricted social life to my home.
6. I have hardly any social life because of my pain.

Section 9: Travelling

1. I can travel anywhere without increased pain.
2. I can travel anywhere, but it increases my pain.
3. My pain restricts my travel over 2 h.
4. My pain restricts my travel over 1 h.
5. My pain restricts my travel to short necessary journeys under 1/2 h.
6. My pain prevents all travel except for visits to the physician/therapist or hospital.

Section 10: Employment/Homemaking

1. My normal homemaking/job activities do not cause pain.
 2. My normal homemaking/job activities increase my pain, but I can still perform all that is required of me.
 3. I can perform most of my homemaking/job duties, but pain prevents me from performing more physically stressful activities (e.g. lifting, vacuuming).
 4. Pain prevents me from doing anything but light duties.
 5. Pain prevents me from doing even light duties.
 6. Pain prevents me from performing any job or homemaking chores.
-

Table 12 AAOS/MODEMS.

AAOS/MODEMS

In the past week, please tell us how pain has affected your ability to perform the following activities. Mark any one statement that best describes your average ability.

Section 1: Getting dressed (in the past week)

1. I can dress myself without pain.
2. I can dress myself without increasing pain.
3. I can dress myself but pain increases.
4. I can dress myself but with significant pain.
5. I can dress myself but with very severe pain.
6. I cannot dress myself.

Section 2: Lifting (in the past week)

1. I can lift heavy objects without pain.
 2. I can lift heavy objects but it is painful.
 3. Pain prevents me from lifting heavy objects off the floor, but I can lift heavy objects if they are on a table.
-

Continued

Table 12 Continued

AAOS/MODEMS

4. Pain prevents me from lifting heavy object, but I can lift light-to-medium objects if they are on a table
5. I can only lift light objects.
6. I cannot lift anything.

Section 3: Walking (in the past week)

1. I can run or walk without pain.
2. I can walk comfortably, but running is painful.
3. Pain prevents me from walking more than 1 h.
4. Pain prevents me from walking more than 30 min.
5. Pain prevents me from walking more than 10 min.
6. I am unable to walk or can walk only a few steps at a time.

Section 4: Sitting (in the past week)

1. I can sit in any chair as long as I like.
2. I can only sit in a special chair as long as I like.
3. Pain prevents me from sitting for more than 1 h.
4. Pain prevents me from sitting for more than 30 min.
5. Pain prevents me from sitting for more than 10 min.
6. Pain prevents me from sitting at all.

Section 5: Standing (in the past week)

1. I can stand as long as I want.
2. I can stand as long as I want, but it increases my pain.
3. Pain prevents me from standing more than 1 h.
4. Pain prevents me from standing more than 30 min.
5. Pain prevents me from standing more than 10 min.
6. Pain prevents me from standing at all.

Section 6: Sleeping (in the past week)

1. I sleep well.
2. Pain occasionally interrupts my sleep.
3. Pain interrupts my sleep half of the time.
4. Pain often interrupts my sleep.
5. Pain always interrupts my sleep.
6. I never sleep well.

Section 7: Travelling (in the past week)

1. I can travel anywhere.
2. I can travel anywhere but it gives me pain.
3. Pain is bad but I can manage to travel over 2 h.
4. Pain restricts me to journeys of less than 1 h.
5. Pain restricts me to trips less than 30 min.
6. Pain prevents me from travelling.

disability items by examining the test–retest reliability and responsiveness of individual items, by using techniques of factor analysis and by application of item response theory.³⁵ The QBPDS assess disability by evaluating the following daily tasks: self-care, sleeping, walking, climbing stairs, sitting, standing, lifting large or heavy objects, bending and stooping, physical activities and houseworks. Social life, sex life and pain intensity are omitted; so pain should be evaluated with other

Table 13 The Quebec back pain disability scale.

Quebec back pain disability scale

This questionnaire is about the way your back pain affects your daily life. People with back problems may find it difficult to perform some of their daily activities. We would like to know if you find it difficult, because of your back, to perform any of the activities listed below. For each activity there is a scale that ranges from 0 (not difficult at all) to 5 (unable to do). Please choose the one response for each activity that best describes your current condition and place a check mark in the appropriate box. Please answer all of the questions.

Because of your back problems, how difficult do you find it today to.	Not difficult at all	Minimally difficult	Somewhat difficult	Fairly difficult	Very difficult	Unable to do
1. Get out of bed?						
2. Sleep through the night?						
3. Turn over in bed?						
4. Ride in a car?						
5. Stand up for 20–30 min?						
6. Sit in a chair for several hours?						
7. Climb one flight of stairs?						
8. Walk a few blocks (300–400 m)?						
9. Walk several miles?						
10. Reach up to high shelves?						
11. Throw a ball?						
12. Run one block (about 100 m)?						
13. Take food out of the refrigerator?						
14. Make your bed?						
15. Put on socks (pantyhose)?						
16. Bend over to clean the bathtub?						
17. Move a chair?						
18. Pull or push heavy doors?						
19. Carry two bags of groceries?						
20. Lift and carry a heavy suitcase?						

scoring system. Each one of 20 daily activities is scored with a six-point difficult scale ranging from 0 ('not difficult at all') to 5 ('unable to do'). The item scores are added up in order to obtain the disability score, which ranges between 0 and 100. The higher values represent greater disability, and sub-scores are not reported.³⁴

The questionnaire is self-administered by the patient, it can be easily completed in about 5–10 min, and scored in less than 2 min.

The Waddell disability index

The Waddell disability index (WDI) (Table 14)³⁶ is nine-item scale which assesses disability by evaluating daily living activities commonly restricted by LBP. The items included are: lifting, sitting, standing, travelling, walking, sleeping, social life, sex life and putting on footwear. Items about work, self-care and sports are not included. Questions are not related to a specific time period and are selected from a previous questionnaire³⁷ and pilot interviews. Patients answer to questions only with positive or negative statement (yes/no). The final score is calculated by adding up positive items, and ranges from 0 to 9.³⁶

The questionnaire is easy to administer; it can be filled out in about 5 min and scored in less than 1 min. It was validated on a chronic LBP population.

The Million visual analogue scale

The Million visual analogue scale (MVAS) (Table 15) is a 15-item questionnaire about disability and pain intensity in patients with LBP.³⁸ The 15 questions investigate the body functions (pain, sleep, stiffness and twisting), daily activities (walking, sitting, standing and work) and social life. Information about item selection process is not

Table 14 The Waddell disability index.

Waddell disability index		Yes	No
<i>Because of your back pain, which following limits do you have?</i>			
1. Help required or avoid heavy lifting, i.e. 30–40 lbs, a heavy suitcase, or a 3–4-year-old child.			
2. Sitting limited to less than 1.5 h.			
3. Travelling in a car or bus limited to less than 1.5 h.			
4. Standing limited to less than 1.5 h.			
5. Walking limited to less than 1.5 h.			
6. Sleep disturbed regularly by low back pain, i.e. 2–3 times per week.			
7. Regularly miss or curtail social activities (excluding sports).			
8. Diminished frequency of sexual activity.			
9. Help regularly required with footwear (tights, socks or tying laces).			

Table 15 The Million visual analogue scale.

Million visual analogue scale

1. Do you have any pain in the back? How severe is it?

No pain–Intolerable

2. Do you have any pain in the night? How severe is it?

No pain–Intolerable

3. Is there anything that you do or are there any circumstances in your lifestyle which make your pain worse? If so, how stressful has this to be to give you pain?

Very stressful–Not stressful at all

4. Do you get relief from pain killers?

Complete relief–No relief

5. Do you have any stiffness in the back?

No stiffness–Intolerable stiffness

6. Does your back pain interfere with your freedom to walk?

Complete freedom to walk–Completely unable to walk because of pain

7. Do you have discomfort when walking?

None at all–Intolerable

8. Does your pain interfere with your ability to stand still?

Stand still for a long time, that is an hour–Not able to stand still at all

9. Does your pain prevent you from turning and twisting?

Complete freedom to twist–Completely incapable of twisting

10. Does your back pain allow you to sit on an upright hard chair?

Complete freedom to sit on a hard chair–So much pain that cannot sit on such a chair at all

11. Does your back pain prevent you from sitting in a soft armchair?

Complete comfort–Such discomfort that cannot sit in a soft chair at all

12. Do you have back pain when lying down in bed?

Complete comfort–No comfort at all

13. What is your overall handicap in your complete lifestyle because of back pain?

Completely free to perform any task–Totally handicapped

14. To what extent does your pain interfere with your work?

No interference at all–Totally incapable of work

15. To what extent does your work have to be modified so that you are able to do your job?

No adjustment to work–So much adjustment that you have had to change your job

available. Score is given on a 100 mm visual analogue scale (VAS). For example, if patients are asked to quantify the severity of his pain (like the first question), they mark a point on a 100-mm line in which the end points are labelled as ‘no pain’ and ‘intolerable’. In each question, it is possible to obtain an index of severity of symptoms in a patient-specific fashion measuring the distance of the marked point from the origin of the line. The final score is calculated by adding up the equally weighted scores.

The questionnaire can be completed in about 5–10 min, and scored in about 2–3 min.

Table 16 The low back outcome score.

Low back outcome score		
Item	Answers	Scores
<i>Factors scoring 9 points</i>		
1. Current pain (VAS)	7–10	0
	5–6	3
	3–4	6
	0–2	9
2. Employment (housewives related to previous abilities)	Unemployed	0
	Part-time	3
	Full time, lighter	6
	Full time, original	9
3. Domestic chores	None	0
	A few but not many	3
	Most, or all but more slowly	6
	Normally	9
4. Sport/active social (dancing)	None	0
	Some-much less than before	3
	Back to previous level	9
<i>Factors scoring 6 points</i>		
1. Resting	Resting more than half the day	0
	Little rest needed, occasionally	4
	No need to rest	6
2. Treatment or consultation	More than once per month	0
	About once per month	2
	Rarely	4
	Never	6
3. Analgesia	Several times each day	0
	Almost every day	2
	Occasionally	4
	Never	6
4. Sex life	Severely affected (impossible)	0
	Moderately affected (difficult)	2
	Mild affected	4
	Unaffected	6
<i>Factors scoring 3 points</i>		
Sleeping, walking, sitting, travelling, dressing	Severely affected (impossible)	0
	Moderately affected (difficult)	1
	Mild affected	2
	Unaffected	3

The low back outcome score

The low back outcome score (LBOS)³⁹ (Table 16) is designed as a self-reported measure to assess the patients with LBP. It is a 13-item questionnaire, and it includes weighted questions about current pain, employment, domestic chores, sport activities, resting, medical

treatments or consultations, drug use, sex life and daily activities (such as sleeping, walking, sitting, travelling, dressing).

The pain question is answered with an 11-point VAS ranging from 'no pain' to 'maximum pain possible'. However, for scoring, the 11 answer possibilities are reduced to four categories (0–2, 3–4, 5–6, 7–10). All the other questions offer an answer for different possibilities, except the sport activities and resting questions, which provide three different answers.

The answering possibilities of each item are scored with a four-point scale, but questions are differently weighted. Three different groups of questions can be identified. Items with a nine-point scoring system (pain, employment, domestic and sport activities) in which the score can be 0, 3, 6 or 9 points. Items with a six-points scoring system (resting, treatment or consultation, analgesia and sex life) in which the score can be 0, 2, 4 or 6 points. Items with a three-points scoring system (sleeping, walking, sitting, travelling, dressing) in which the score can be 0, 1, 2 or 3 points. The final score is obtained by summing the score of each item and it ranges from 0 to 75, with lower values representing greater disability.

The questionnaire can be completed in about 5 min and scored in less than 1 min.

The low back pain rating scale

The low back pain rating scale (LBPRS)⁴⁰ (Table 17) is a rating system designed to evaluate the clinical outcome of LBP patients. This instrument includes three different components: pain, disability and physical impairment. The pain component consists of six questions divided into two groups: three questions about back pain and three questions about leg pain. Each item is scored with the VAS. Items are the following: LBP/leg pain at the time of examination (0–10 points), the worst LBP/leg pain within the last 2 weeks (0–10 points) and the average level of the back pain/leg pain during the same period (0–10 points). The final score ranges from 0 to 30 for both low back/leg pain. Therefore, the pain component in total gives 0–60 points. The disability component consists of 15 questions evaluating the patient's ability to perform daily activities, such as sleeping, ability to perform houseworks, walking, sitting, lifting, working, dressing, driving, running, getting up from a chair, climbing stairs, contact with people and expectations of future pain. Each question can be answered with three different possible answers and is scored with a three-point Likert scale. Answers are the following: 'yes' (0 points), 'can be a problem' (1 point) or 'no' (2 points). The disability component gives a total score of 0–30 points. The physical impairment component is evaluated by measuring the back muscle endurance, spinal

Table 17 The Low back pain rating scale.

Low back pain rating scale		
Back and leg pain		
<i>Items</i>	<i>Scores</i>	
1. Back pain at the time of the examination	VAS: no pain (0 points)–worst imaginable pain (10 points)	
2. Leg pain at the time of the examination	VAS: no pain (0 points)–worst imaginable pain (10 points)	
3. The worst back pain within the last 2 weeks	VAS: no pain (0 points)–worst imaginable pain (10 points)	
4. The worst leg pain within the last 2 weeks	VAS: no pain (0 points)–worst imaginable pain (10 points)	
5. Average level of back pain during the last 2 weeks	VAS: no pain (0 points)–worst imaginable pain (10 points)	
6. Average level of leg pain during the past 2 weeks	VAS: no pain (0 points)–worst imaginable pain (10 points)	
<i>Disability index</i>		
<i>Items</i>	<i>Answers</i>	<i>Score</i>
1. Can you sleep at night without low back pain interfering?	Yes	0
	Can be problem	1
	No	2
2. Can you do your daily work without low back pain reducing your activities?	Yes	0
	Can be problem	1
	No	2
3. Can you do the easy chores at home such as watering flowers or cleaning the table?	Yes	0
	Can be problem	1
	No	2
4. Can you put on shoes and stockings by yourself?	Yes	0
	Can be problem	1
	No	2
5. Can you carry two full shopping bags (10 kilograms total)?	Yes	0
	Can be problem	1
	No	2
6. Can you get up from a low armchair without difficulty?	Yes	0
	Can be problem	1
	No	2
7. Can you bend over the wash basin to brush your teeth?	Yes	0
	Can be problem	1
	No	2
8. Can you climb stairs from one floor to another without resting because of low back pain?	Yes	0
	Can be problem	1

Continued

Table 17 Continued

Low back pain rating scale		
Back and leg pain		
Items		Scores
	No	2
9. Can you walk 400 meters without resting because of low back pain?	Yes	0
	Can be problem	1
	No	2
10. Can you run 100 meters without resting because of low back pain?	Yes	0
	Can be problem	1
	No	2
11. Can you ride a bike or drive a car without feeling any low back pain?	Yes	0
	Can be problem	1
	No	2
12. Does low back pain influence your emotional relationship to your nearest family?	Yes	0
	Can be problem	1
	No	2
13. Did you have to give up contact with other people within the last 2 weeks because of low back pain?	Yes	0
	Can be problem	1
	No	2
14. If it was a present interest do you think that there are certain jobs which you would not be able to manage because of your back trouble?	Yes	0
	Can be problem	1
	No	2
15. Do you think that the low back pain will influence your future?	Yes	0
	Can be problem	1
	No	2
<i>Physical impairment Measure</i>		
	<i>Finding</i>	<i>Points</i>
1. Back muscle endurance (s)	≥270	0
	240–269	1
	210–239	2
	180–209	3
	150–179	4
	120–149	5
	90–119	6
	60–89	7
	30–59	8
	1–29	9
	0	10

Continued

Table 17 Continued

Low back pain rating scale		
Back and leg pain		
Items		Scores
2. Back mobility (modified Schober's test) (mm)	≥ 14	0
	50–59	2
	40–49	4
	30–39	6
	20–29	8
	0–19	10
3. Overall mobility test(s)	< 10	0
	10–19	2
	20–29	4
	30–39	6
	40–49	8
	≥ 50	10
4. Analgesic use	None during past week	0
	Use NSAID or non-narcotic analgesic 1–4 times a week	2
	Use of NSAID or non-narcotic analgesic 5+ times a week	4
	Use NSAID or non-narcotic analgesic 1–4 times a week	2
	Use of NSAID or non-narcotic analgesic 5+ times a week	4

mobility, patient mobility and use of analgesics. Muscle endurance and spinal/patient mobility are recorded with specific physical test, and each is scored on a scale ranging from 0 to 10. Use of analgesics/NSAID is scored as follows: 'no use during a week' (0 points); 'use of NSAID/non-narcotic analgesics up to 4 times a week' (2 points); 'use of NSAID/non-narcotic analgesics more than 4 times a week' (4 points); 'use of morphine/analogues up to 4 times a week' (8 points) and 'use of morphine/analogues more than 4 times a week' (10 points). The physical impairment component in total gives 0–40 points.

The three different components are weighted: 60 points for pain scoring, 30 points for disability and 40 points for physical impairment. Therefore, combining them, the final LBPRS score ranges from 0 (in patient without back problems) to 130 (in disabled patient). The questionnaire can be filled out in about 15 min and scored in about 3–5 min.

The NASS lumbar spine outcome assessment instrument

The NASS lumbar spine outcome assessment instrument (NASS LSO) was first published by Daltroy *et al.*,³³ and is derived from a consensus

of the NASS. It consists of 62 main question obtained from three different existing questionnaires: the SF36, a modified ODI and a modified employment assessment published by Bigos.⁴¹

The NASS data are grouped into five categories. The first group consists of demographic data (age, sex, race, education and insurance information). The second group consists of the medical history (diagnosis, past surgeries, comorbidities, etc.). The third group includes: pain, neurogenic symptoms and function. These domains are measured by a modified ODI version. The fourth group is represented by employment history, evaluated by a score system published by Bigos *et al.*⁴¹ The fifth group consists of data about outcomes of treatment, but it is included only in the follow-up module.

The scoring is complex and subscores are extractable (modified ODI, SF36, pain and disability scale, neurogenic symptoms scale, job exertion scale, expectation and satisfaction scale).⁴² The questionnaire is long and it takes 20 min to be filled out.

The clinical back pain questionnaire

The clinical back pain questionnaire (CBPQ) (Table 18), also known as the Aberdeen LBP scale, is a 19-items questionnaire, consisting of questions commonly used in the clinical assessment of patients with LBP.⁴³ It includes questions about body functions (pain, sleep, bending, loss of feeling and leg weakness) and questions about daily activities (self-care, walking, sitting, standing, sport, housework and resting). There are 6 multiple choice questions and 13 single choice questions. Answering possibilities for each question can vary between three and six items. The answer categories to each single choice question are scored in an ordinal manner (e.g. 0, 1, 2, 3 points, etc.), while multiple choice questions' responses are assigned a score of one point. The 'back pain severity score' is calculated by summing the score of the responses' to each question, and then it is converted to percentages. The final score ranges between 0 and 100 with the higher values representing greater disability.

The questionnaire is easy to administer, can be completed within 5–10 min, and scored within 3 min.

The resumption of activities of daily living scale

The resumption of activities of daily living scale (RADL) (Table 19) scale is designed to assess broad areas often affected by back injury.⁴⁴ The scale measures the extent of resumption of a person's 'usual'

Table 18 The clinical back pain questionnaire.

Clinical back pain questionnaire

1. *In the last two weeks, for how many days did you suffer pain in the back or leg(s)?*

(please mark one answer)

None at all

Between 1 and 5 days

Between 6 and 10 days

For more than 10 days

2. *On the worst day during the last two weeks, how many painkilling tablets did you take?*

(please mark one answer)

None at all

Less than 4 tablets

Between 4 and 8 tablets

Between 9 and 12 tablets

More than 12 tablets

3. *Is the pain made worse by any of the following? (please mark all answers that apply to you)*

Coughing

Sneezing

Sitting

Standing

Bending

Walking

4. *Do any of the following movements ease the pain? (please mark all answers that apply to you)*

Lying down

Sitting down

Standing

Walking

5. *In your right leg, do you have any pain in the following areas? (please mark all answers that apply to you)*

Pain in the buttock

Pain in the high

Pain in the shin/calf

Pain in the foot/ankle

6. *In your left leg, do you have any pain in the following areas? (please mark all answers that apply to you)*

Pain in the buttock

Pain in the high

Pain in the shin/calf

Pain in the foot/ankle

7. *Do you have any loss of feeling in your legs? (please mark one answer)*

No

Yes, just one leg

Yes, both legs

8. *In your right leg, do you have any weakness or loss of power in the following areas? (please mark all answers that apply to you)*

The hip

The knee

The ankle

The foot

Continued

Table 18 Continued

Clinical back pain questionnaire

9. In your left leg, do you have any weakness or loss of power in the following areas? (please mark all answers that apply to you)

The hip
The knee
The ankle
The foot

10. If you were to try and bend forwards without bending your knees, how far down do you think you could bend before the pain stopped you? (please mark one answer)

I could touch the floor
I could touch my ankles with the tips of my fingers
I could touch my mid-thighs with the tips of my fingers
I could touch my knees with the tips of my fingers
I could not bend forward at all

11. On the worst night during the last 2 weeks, how badly was your sleep affected by the pain? (please mark one answer)

Not affected at all
I didn't lose any sleep but needed tablets
It prevented me from sleeping but I slept for more than 4 h
I only had 2–4 h sleep
I had less than 2 h sleep

12. On the worst day during the last 2 weeks, did the pain interfere with your ability to sit down? (please mark one answer)

I was able to sit in any chair as long as I liked
I could only sit in my favourite chair as long as I liked
Pain prevented me from sitting more than 1 h
Pain prevented me from sitting more than 30 min
Pain prevented me from sitting more than 15 min
Pain prevented me from sitting at all

13. On the worst day during the last 2 weeks, did the pain interfere with your ability to stand? (please mark one answer)

I could stand as long as I wanted without extra pain
I could stand as long as I wanted but it gave me extra pain
Pain prevented me from standing more than 1 h
Pain prevented me from standing more than 30 min
Pain prevented me from standing more than 15 min
Pain prevented me from standing at all

14. On the worst day during the last 2 weeks, did the pain interfere with your ability to walk? (please mark one answer)

Pain did not prevent me walking any distance
Pain prevented me walking more than 1 mile
Pain prevented me walking more than 1/2 mile
Pain prevented me walking more than 1/4 mile
I can walk but less than 1/4 mile
I was unable to walk at all

15. In the last 2 weeks, did the pain prevent you from carrying out your work/housework and other daily activities? (please mark one answer)

No, not at all
I could continue with my work, but my work suffered

Continued

Table 18 Continued

Clinical back pain questionnaire

Yes, for 1 day
 Yes, for 2–6 days
 Yes, for more than 7 days

16. *In the last 2 weeks, for how many days have you had to stay in bed because of the pain? (please mark one answer)*

None at all
 Between 1 and 5 days
 Between 6 and 10 days
 For more than 10 days

17. *In the last 2 weeks, has your sex life been affected by your pain? (please mark one answer)*

Not affected by the pain
 Mildly affected by the pain
 Moderately affected by the pain
 Severely affected by the pain
 Does not apply

18. *In the last 2 weeks, have your leisure activities been affected by your pain (including sports, hobbies and social life)? (please mark one answer)*

Not affected by the pain
 Mildly affected by the pain
 Moderately affected by the pain
 Severely affected by the pain
 Pain prevents any social life at all

19. *In the last 2 weeks, has the pain interfered with your ability to look after yourself, e.g. washing, dressing, etc.? (please mark one answer)*

Not at all
 Because of the pain, I needed some help looking after myself
 Because of the pain, I needed a lot of help looking after myself
 Because of the pain, I could not look after myself at all

activities since the time of injury. The final 12-item RADL includes the following areas: sleeping patterns, sexual activity, self-care, light and heavy household chores, shopping, socializing inside and outside home, travelling, recreational activities and paid employment. Each item is scored with a graphic scale ranging from 0 (not at all) to 100% (complete resumption). The total RADL score can vary from 0 to 100; it is obtained by summing across the items and dividing by the number of items. At least 9 items of the 12 questions have to be completed to calculate a total score for each patient.

The functional rating index

The functional rating index (FRI) (Table 20) is a 10-item scoring system designed to measure both patient's perception of function and pain of the spinal musculoskeletal system.⁴⁵ The instrument includes:

Table 19 The resumption of activities of daily living scale.

Resumption of activities of daily living scale												
Since your injury, to what extent have you resumed your usual activities in each of the following areas? If you do not do an activity, put N/A (nonapplicable) beside the scale. As you rate each activity, think of how you are today. Mark the box on the scale for each question.												
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
1. Sleeping patterns												
2. Sexual activity												
3. Self-care (e.g. washing, dressing)												
4. Light household chores (e.g. doing dishes, making beds, preparing meals)												
5. Heavy household chores (e.g. yardwork, cleaning windows, doing laundry)												
6. Shopping												
7. Socializing with family and friends inside your home												
8. Socializing with family and friends outside your home												
9. Travelling (in cars, buses, etc.) for less than 30 min												
10. Travelling (in cars, buses, etc.) for longer than 1 h												
11. Engaging in your usual recreational activities												
12. Engaging in your usual paid employment												

eight items focus on daily activities (sleeping, self-care, travel, work, recreation, lifting, walking and standing) that can be affected by a spinal disease and two items focus on two different aspects of pain (intensity and frequency). Each item is scored with a five-point scale ranging from 0 (no pain or full ability to function) to 4 (worst possible pain or unable to perform a specific function at all). The index score is achieved by adding up the equally weighted scores, dividing by the maximum possible score, and multiplying by 100%. When all 10 items are answered, the formula is the following: $(\text{total score}/40) \times 100\%$. The final score ranges from 0 (representing absence of disability) to 100% (representing severe disability). Therefore, the higher the score the higher the perception of dysfunction and pain.

Table 20 The functional rating index.

Functional rating index

In order to properly assess your condition, we must understand how much your neck and/or back problems have affected your ability to manage everyday activities. For each item below, please mark the box which most closely describes your condition right now.

	0	1	2	3	4
1. Pain intensity	No pain	Mild pain	Moderate pain	Severe pain	Worst possible pain
2. Sleeping	Perfect sleep	Mildly disturbed sleep	Moderately disturbed sleep	Greatly disturbed sleep	Totally disturbed sleep
3. Personal care (washing, dressing, etc.)	No pain; no restrictions	Mild pain; no restrictions	Moderate pain; need to go slowly	Moderate pain; need some assistance	Severe pain; need 100% assistance
4. Travel (driving, etc.)	No pain on long trips	Mild pain on long trips	Moderate pain on long trips	Moderate pain on short trips	Severe pain on short trips
5. Work	Can do usual work plus unlimited extra work	Can do usual work; no extra work	Can do 50% of usual work	Can do 25% of usual work	Cannot work
6. Recreation	Can do all activities	Can do most activities	Can do some activities	Can do a few activities	Cannot do any activities
7. Frequency of pain	No pain	Occasional pain; 25% of the day	Intermittent pain; 50% of the day	Frequent pain; 75% of the day	Constant pain; 100% of the day
8. Lifting	No pain with heavy weight	Increased pain with heavy weight	Increased pain with moderate weight	Increased pain with light weight	Increased pain with any weight
9. Walking	No pain; any distance	Increased pain after 1 mile	Increased pain after 1/2 mile	Increased pain after 1/4 mile	Increased pain with all walking
10. Standing	No pain after several hours	Increased pain after several hours	Increased pain after 1 h	Increased pain after 1.5 h	Increased pain with any standing

The back pain functional scale

The back pain functional scale (BPFS) (Table 21) is a self-report measure evaluating patient's functional status in clinical and researching settings.⁴⁶ Item selection was from existing questionnaires (such as SIP,⁴⁷ OLBPD,²⁰ QBPD,³⁴ Dallas pain questionnaire(DPQ),⁴⁸ RMQ,¹⁰ MOS-36,⁴⁹ PSFS⁵⁰) and interviews with physical therapists. Items reduction was performed by examining the test–retest reliability, internal consistency, content and construct validity. The final version of the BPFS consists of 12 items, investigating work, hobbies, home activities, bending or stooping, dressing shoes or socks, lifting, sleeping, standing, walking, climbing stairs, sitting and driving. Each item is scored with a six-point scale, in which 0 means unable to perform activity, 1 extreme difficulty, 2 quite a bit of difficulty, 3 moderate difficulty, 4 a little bit of difficulty and 5 no difficulty. The total BPFS score can vary from 0, representing the lowest functional level, to 60, representing the highest functional level.

The questionnaire takes less than 5 min to complete and about 30 s to score.

The general function score

The general function score (GFS) (Table 22) is a disease-specific instrument consisting of nine items, created to measure physical disability in patients with LBP.⁵¹ The original version consists of 17 items concerning physical activities of daily living. The final GFS includes just 9 of the 17 original items, showing high individual correlations, validity, reliability, responsiveness and feasibility. The final items are walking a flight of stairs; sitting more than 30 min; standing more than 30 min; walking more than 30 min; lifting more than 10 kg; lean over a basin; carry a bag of groceries; make the bed and dressing. Each item can be answered with three possible response alternatives: 'can perform', 'can perform with difficulty' or 'cannot perform'. These responses are respectively scored as 0, 1 and 2 points. The total score is obtained by summing each item's score, but it is represented as a percentage: 0% means no physical disability and 100% means maximal physical disability.

The questionnaire is filled out in about 2 min and scored in less than 1 min.

The patient-specific functional scale

The patient-specific functional scale (PSFS) (Table 23)⁵⁰ is a patient self-defined instrument, designed to record and measure a list of

Table 21 The back pain functional scale.

Back pain functional scale

On the questions listed below we are interested in knowing whether you are having ANY DIFFICULTY at all with the activities because of your back problem for which you are currently seeking attention. Please provide an answer for each activity (marking one box for each question). Today, do you or would you have any DIFFICULTY at all with the following activities BECAUSE OF YOUR BACK PROBLEM?

	Unable to perform activity (0 points)	Extreme difficulty (1 points)	Quite a bit of difficulty (2 points)	Moderate difficulty (3 points)	A little bit of difficulty (4 points)	No difficulty (5 points)
1. Any of your usual work, housework, or school activities						
2. Your usual hobbies, recreational, or sporting activities						
3. Performing heavy activities around your home						
4. Bending or stooping						
5. Putting on your shoes or socks (pantyhose)						
6. Lifting a box of groceries from the floor						
7. Sleeping						
8. Standing for 1 h						
9. Walking a mile						
10. Going up or down 2 flights of stairs (about 20 stairs)						
11. Sitting for 1 h						
12. Driving for 1 h						

Table 22 The general function score.

General function score			
	Can perform (0 points)	Can perform with difficulty, due to low back pain (1 point)	Cannot perform, due to low back pain (2 points)
1. Walk a staircase			
2. Sit >30 min			
3. Stand >30 min			
4. Walk >30 min			
5. Lift >10 kg			
6. Lean over a basin			
7. Carry a bag of groceries			
8. Dress			
9. Make the bed			

Table 23 The patient-specific functional scale.

Patient-Specific Functional Scale											
CLINICIAN TO READ AND FILL IN BELOW: Complete at the end of the history and prior to physical examination.											
<i>Initial assessment:</i> I am going to ask you to identify up to three important activities that you are unable to do or are having difficulty with as a result of your problem. Today, are there any activities that you are unable to do or having difficulty with because of your problem? (Clinician: show scale to patient and have the patient rate each activity.)											
<i>Follow-up assessments:</i> When I assessed you on (state previous assessment date), you told me that you had difficulty with (read all activities from list at a time). Today, do you still have difficulty with:(read and have patient score each item in the list)?											
PAIN QUESTION SET											
Scoring scale											
0	1	2	3	4	5	6	7	8	9	10	
Unable to perform activity										Able to perform activity pre-injury level	
Activity		Date/Score									
1.											
2.											
3.											
4.											
5.											
PAIN LIMITATION											
Over the past 24 hours, has the pain limited you from performing any of your normal daily activities?											
0	1	2	3	4	5	6	7	8	9	10	
Activities have been severely limited										Activities have not been limited	
PAIN INTENSITY											
Over the past 24 hours, how bad has your pain been?											
0	1	2	3	4	5	6	7	8	9	10	
No pain										Pain as bad as it can be	

disabilities specific for each patient. The questionnaire has three separate sections: pain question set, pain limitation section and pain intensity section. The first section includes a list of activities chosen by the patient. Patients are asked to identify the five most affected activities in their daily living, because of the low back pain. A slightly different version has been also described in a population with neck dysfunction,⁵² in which the list of activities includes only three items plus the space for additional activities. To quantify the level of disability, each item is scored with an 11-point scale, ranging from 0 ('unable to perform activity') to 10 ('able to perform activity at pre-injury status level'). The second section assesses the functional limitation from pain during the previous 24 h. Pain limitation is also scored with an 11-point scale, ranging from 0 ('activities have been severely limited') to 10 ('activities have not been limited'). The third section measures pain intensity during the previous 24 h. Scoring is performed using an 11-point scale, in which the orientation is reversed, because 0 means 'no pain' and 10 means 'pain as bad as it can be'.

The PSFS can be administered and recorded in about 4 min. It should be administered during history taking and prior to physical examination. The clinician should read the instructions to the patient and record the activities, the corresponding score and the assessment date. At subsequent reassessments, the clinician reads the follow-up instructions, and records the score of the previously identified activities and the date.⁵³

The outcome measure in lumbar spinal stenosis

The outcome measure in lumbar spinal stenosis (OMLSS) (Table 24) is a short self-administered questionnaire for the assessment of patients with lumbar spinal stenosis.⁵⁴ The questionnaire includes three sections: symptom severity, physical function and patient satisfaction. The items for each section were selected from a literature consultation and interviews with rheumatologists and orthopaedic surgeons specialized in spine surgery.

The symptom severity scale includes seven items: pain severity, pain frequency, pain in the back, pain in the leg, weakness, numbness and balance disturbance. Questions 1, 3, 4, 5 and 6 can be answered as follows: none, mild, moderate, severe and very severe. These responses are respectively scored with 1, 2, 3, 4 and 5 points. Also, question 2 has five possible responses scored with a five-point scale: less than once a week (1 point); at least once a week (2 points); everyday, for at least a few minutes (3 points); everyday, for most of the day (4 points) and every minute of the day (5 points). However, balance disturbance has

Table 24 The outcome measure in lumbar spinal stenosis.

Outcome measure in lumbar spinal stenosis		
Item	Answers	Scores
In the last month, how would you describe The pain you have had on average including pain in your back, buttocks and pain that goes down the legs?	None	1
	Mild	2
	Moderate	3
	Severe	4
	Very severe	5
How often have you had back, buttock or leg pain?	Less than once a week	1
	At least once a week	2
	Everyday, for at least a few min	3
	Everyday, for most of the day	4
	Every minute of the day	5
The pain in your back or buttocks?	None	1
	Mild	2
	Moderate	3
	Severe	4
	Very severe	5
The pain in your legs or feet?	None	1
	Mild	2
	Moderate	3
	Severe	4
	Very severe	5
Numbness or tingling in your legs or feet?	None	1
	Mild	2
	Moderate	3
	Severe	4
	Very severe	5
Weakness in your legs or feet?	None	1
	Mild	2
	Moderate	3
	Severe	4
	Very severe	5
Problems with your balance?	No, I've had no problems with balance	1
	Yes, sometimes I feel my balance is off, or that I am not sure-footed	3
	Yes, often I feel my balance is off, or that I am not sure-footed	5
<i>In the last month, on a typical day</i> How far have you been able to walk?	Over 2 miles	1
	Over 2 blocks, but less than 2 miles	2
	Over 50 feet, but less than 2 blocks	3
	Less than 50 feet	4

Continued

Table 24 *Continued*

Outcome measure in lumbar spinal stenosis		
Item	Answers	Scores
Have you taken walks outdoors or in malls for pleasure?	Yes, comfortably	1
	Yes, but sometimes with pain	2
	Yes, but always with pain	3
	No	4
Have you been shopping for groceries or other items?	Yes, comfortably	1
	Yes, but sometimes with pain	2
	Yes, but always with pain	3
	No	4
Have you walked around the different rooms in your house or apartment?	Yes, comfortably	1
	Yes, but sometimes with pain	2
	Yes, but always with pain	3
	No	4
Have you walked from your bedroom to the bathroom	Yes, comfortably	1
	Yes, but sometimes with pain	2
	Yes, but always with pain	3
	No	4
<i>How satisfied are you with</i>		
The overall result of back operation?	Very satisfied	1
	Somewhat satisfied	2
	Somewhat dissatisfied	3
	Very dissatisfied	4
Relief of pain following the operation?	Very satisfied	1
	Somewhat satisfied	2
	Somewhat dissatisfied	3
	Very dissatisfied	4
Your ability to walk following the operation?	Very satisfied	1
	Somewhat satisfied	2
	Somewhat dissatisfied	3
	Very dissatisfied	4
Your ability to do housework, yard work or job following the operation?	Very satisfied	1
	Somewhat satisfied	2
	Somewhat dissatisfied	3
	Very dissatisfied	4
Your strength in the thighs, legs and feet?	Very satisfied	1
	Somewhat satisfied	2
	Somewhat dissatisfied	3
	Very dissatisfied	4
Your balance or steadiness on your feet?	Very satisfied	1
	Somewhat satisfied	2
	Somewhat dissatisfied	3
	Very dissatisfied	4

only three answers: none (1 point), sometimes (3 points) and often (5 points). The symptom severity scale score is calculated by summing score of each answered item and dividing for the number of answered questions. The score can range from 1 to 5. If more than two items are missing, the scale score cannot be obtained.

The physical function scale consists of five questions about walking distance, ability to walk for pleasure, for shopping, for getting around the house and from bathroom to bedroom. All questions are scored with a four-point scale. Questions 2, 3, 4 and 5 can be answered as follows: yes, comfortably (1 point); yes, but sometimes with pain (2 points); yes, but always with pain (3 points) and no, could not perform (4 points). Question 1 can be answered as follows: more than 2 miles (1 point), more than 2 blocks but less than 2 miles (2 points), more than 50 feet but less than 2 blocks (3 points) and less than 50 feet (4 points). The physical function scale score is obtained by adding up score of each answered item and dividing by the number of answered questions. The score can range from 1 to 4. If more than two items are missing, the scale score cannot be calculated.

The patient satisfaction scale includes six questions about satisfaction with the overall result of the back operation, pain relief after the operation, walking ability after the operation, ability to do housework or job after the operation, strength in the thighs, legs or feet and balance or steadiness on feet. All questions are scored with a four-point scale and can be answered as follows: very satisfied (1 point), somewhat satisfied (2 points), somewhat dissatisfied (3 points) and very dissatisfied (4 points). The satisfaction scale score is obtained by summing the score of each answered item and dividing for the number of answered questions. The score can range from 1 to 4. If the number of responses exceed four, the scale score can be calculated. The questionnaire is very easy to compile and to score.

The back illness pain and disability nine-item scale

The back illness pain and disability nine-item scale (BACKILL)⁵⁵ (Table 25) aims to detect disability and response to treatment in chronic low-back pain affected patients. Items are selected from three pre-existing validated instruments: the PAIN-FREE8, which is an 8-item version of McGill Pain Questionnaire;⁵⁶ the Functional Assessment Screening Questionnaire with five items,^{57,58} which is derived from the original 15-item FASQ;⁵⁹ the Oswestry low back pain disability questionnaire with eight items, which is a shorter version of the original OSW.²⁰ The BACKILL includes two items for pain (aching and tiring), and seven items for mobility (lifting, sitting for 30 min,

Table 25 The back illness pain and disability nine-item scale.

Back illness pain and disability nine-item scale		
Item	Answers	Scores
How is your pain?		
1. Aching	None	4
	Mild	3
	Moderate	2
	Severe	1
2. Tiring	None	4
	Mild	3
	Moderate	2
	Severe	1
Do you find		
3. Sitting for 30 min	Easy	4
	A little difficulty	3
	A lot of difficulty	2
	Cannot do without help	1
4. Standing for 30 min	Easy	4
	A little difficulty	3
	A lot of difficulty	2
	Cannot do without help	1
5. Getting up from a low seat	Easy	4
	A little difficulty	3
	A lot of difficulty	2
	Cannot do without help	1
6. Lifting	I can lift heavy weights without having extra discomfort.	6
	I can lift heavy weights but I get extra discomfort.	5
	I can lift heavy weights only if they are conveniently positioned.	4
	I can only lift light-to-medium weights if they are conveniently positioned.	3
	I can lift only very light weights.	2
	I cannot lift or carry anything at all.	1
7. Walking	I am able to walk any distance.	6
	Discomfort prevents me from walking more than 1 mile.	5
	Discomfort prevents me from walking more than 1/2 mile.	4
	Discomfort prevents me from walking more than 1/4 mile.	3
	I walk only a limited distance or use a cane, crutches, or a walker.	2
	I am in bed most of the time or I use a wheelchair.	1
8. Travelling	I can travel anywhere without extra discomfort.	6
	I can travel anywhere but it gives me extra discomfort.	5
	I manage trips over 2 h but with some discomfort.	4
	My discomfort limits me to trips of less than 1 h duration.	3
	My discomfort limits me to short, necessary trips under 30 min.	2
	My discomfort prevents me from travelling except to the doctor or hospital.	1
9. Personal care	I can look after myself normally without having extra discomfort.	6
	I can look after myself normally but have extra discomfort.	5
	It is uncomfortable to look after myself and I am slow and careful.	4

Continued

Table 25 Continued

Back illness pain and disability nine-item scale		
Item	Answers	Scores
	I need some help but I manage most of my personal care.	3
	I need help every day in most aspects of self-care.	2
	I do not get dressed, I wash with difficulty and I stay in bed.	1

standing for 30 min, travelling, getting up from a low seat, walking and personal care). Items about pain are scored with a four-point scale: none (4 points), mild (3 points), moderate (2 points) and severe (1 points). Three items about mobility (standing, sitting and getting up from a low seat) are also scored with a four-point scale: easy (4 points), a little difficulty (3 points), a lot of difficulty (2 points) and unable to do without help (1 points). Resting mobility items are scored with a six-point scale in which possible answers are specific for each question. Moreover two additional items can be included (fearful and punishing-cruel). They are scored separately from BACKILL items, with a four-point scale. The questionnaire is self-administered and it is easy to complete and to score.

The Bournemouth questionnaire

The Bournemouth questionnaire (BQ)⁶⁰ (Table 26) is a short-form multidimensional questionnaire designed to measure the outcomes in back pain patients. The items included in the questionnaire were obtained by reviewing the literature. Seven aspects of the back pain experience were selected. These aspects were the most commonly measured, and showed significant responsiveness to clinical change. Domains are the following: pain intensity; ability to perform daily activities and social activities; anxiety status; depression status; pain interference with work activities and pain locus control. Each item is scored with an 11-point numerical rating scale from 0 to 10. A total score can be obtained by summing result of each item, although the authors recommend to express the total score of the BQ as a percentage. The questionnaire can be completed and scored quickly.

The Dallas pain questionnaire

The DPQ⁴⁸ (Table 27) is a 16-item instrument to assess the four aspects of daily living affected by chronic back pain: day-to-day

Table 26 The Bournemouth questionnaire.

Bournemouth Questionnaire									
The following scales have been designed to find out about your back pain and how it is affecting you. Please answer <i>all</i> the scales by circling <i>one</i> number on <i>each</i> scale that best describes how you feel.									
1. Over the past week, on average, how would you rate your back pain?									
1 No pain	2	3	4	5	6	7	8	9	10 Worst pain possible
2. Over the past week, how much has your back pain interfered with your daily activities (housework, washing, dressing, walking, climbing stairs, getting in/out of bed/chair)?									
1 No interference	2	3	4	5	6	7	8	9	10 Unable to carry out activity
3. Over the past week, how much has your back pain interfered with your ability to take part in recreational, social, and family activities?									
1 No interference	2	3	4	5	6	7	8	9	10 Unable to carry out activity
4. Over the past week, how anxious (tense, uptight, irritable, difficulty in concentrating/relaxing) have you been feeling?									
1 Not at all anxious	2	3	4	5	6	7	8	9	10 Extremely anxious
5. Over the past week, how depressed (down-in-the-dumps, sad, in low spirits, pessimistic, unhappy) have you been feeling?									
1 Not at all depressed	2	3	4	5	6	7	8	9	10 Extremely depressed
6. Over the past week, how have you felt your work (both inside and outside the home) has affected (or would affect) your back pain?									
1 Have made it no worse	2	3	4	5	6	7	8	9	10 Have made it much worse
7. Over the past week, how much have you been able to control (reduce/help) your back pain on your own?									
1 Completely control it	2	3	4	5	6	7	8	9	10 No control whatsoever

activities, such as pain and intensity, personal care, lifting, standing, sitting, walking and sleeping; work and leisure activities, such as social life, travelling and vocational; anxiety-depression status, including anxiety and mood, emotional control and depression; and social interest, such as interpersonal relationship, social support and punishing responses. Each item is scored with a VAS, divided into five, six, seven or eight small segments (it depends on the question). Scale extremities are labelled with specific words (e.g. 'no pain'/'all the time') and with percentage (0%/100%). For every specific question, the patient marks the point on the scale which represents his/her condition.

For scoring, 0 points are assigned to the left-hand segment, 1 point to the next segment, 2 points to the next segment and so on to the last segment. Item scores are added and multiplied by a constant to obtain the percentage of pain interference with each of four daily living aspects evaluated by DPQ. The constant used for daily activities section is 3, while the constant used for work/leisure activities, anxiety/depression and social interest section is 5. The DPQ can be answered in 3–5 min and scored in less than 1 min.

Table 27 The Dallas pain questionnaire.

Dallas Pain Questionnaire			
This questionnaire has been designed to give your doctor information as to how your pain has affected your life. Be sure that these are your answers. Do not ask someone else to fill out the questionnaire for you. Please mark an "X" along the line that expresses your thoughts from 0 to 100 in each section.			
Section I: Pain and Intensity			
To what degree do you rely on pain medications or pain relieving substances for you to be comfortable?			
None	Some	All the time	
0% (_____ : _____ : _____ : _____ : _____) 100%			
Section II: Personal Care			
How much does pain interfere with your personal care (getting out of bed, teeth brushing, dressing, etc.)?			
None (no pain)	Some	I cannot get out of bed	
0% (_____ : _____ : _____ : _____ : _____) 100%			
Section III: Lifting			
How much limitation do you notice in lifting?			
None (I can lift as I did)	Some	I cannot lift anything	
0% (_____ : _____ : _____ : _____ : _____) 100%			
Section IV: Walking			
Compared to how far you could walk before your injury or back trouble, how much does pain restrict your walking now?			
I can walk the same	Almost the same	Very little	I cannot walk
0% (_____ : _____ : _____ : _____ : _____) 100%			
Section V: Sitting			
Back pain limits my sitting in a chair to:			
None, pain some as before	Some	I cannot sit at all	
0% (_____ : _____ : _____ : _____ : _____) 100%			
Section VI: Standing			
How much does your pain interfere with your tolerance to stand for long periods?			
None, pain some as before	Some	I cannot stand	
0% (_____ : _____ : _____ : _____ : _____) 100%			
Section VII: Sleeping			
How much does pain interfere with your sleeping?			
None some as before	Some	I cannot sleep at all	
0% (_____ : _____ : _____ : _____ : _____) 100%			
<i>Sum x 3 = % Daily Activities Interference</i>			
Section VIII: Social Life			
How much does pain interfere with your social life (dancing, games, going out, eating with friends, etc.)?			
None some as before	Some	No activities total loss	
0% (_____ : _____ : _____ : _____ : _____) 100%			

Continued

Table 27 Continued

Section IX: Traveling		
How much does pain interfere with traveling in a car?		
None some as before	Some	I cannot travel
0% (_____) 100%		
Section X: Vocational		
How much does pain interfere with your job?		
None No interference	Some	I cannot work
0% (_____) 100%		
<i>Sum x 5 = % Work/Leisure Activities Interference</i>		
Section XI: Anxiety/Mood		
How much control do you feel that you have over demands made on you?		
Total	Some	None
100% (_____) 0%		
Section XII: Emotional Control		
How much control do you feel you have over your emotions?		
Total	Some	None
100% (_____) 0%		
Section XIII: Depression		
How depressed have you been since the onset of pain?		
Not depressed significantly		Overwhelmed by depression
0% (_____) 100%		
<i>Sum x 5 = % Anxiety/Depression Interference</i>		
Section XIV: Interpersonal Relationships		
How much do you think your pain has changed your relationships with others?		
Not changed		Drastically changed
0% (_____) 100%		
Section XV: Social Support		
How much support do you need from others to help you during this onset of pain (talking over chores, fixing meals, etc.)?		
None needed		All the time
0% (_____) 100%		
Section XVI: Punishing Response		
How much do you think others express irritation, frustration or anger toward you because of your pain?		
None	Some	All the time
0% (_____) 100%		
<i>Sum x 5 = % Social Interest Interference</i>		

The disability rating index

The disability rating index (DRI)⁶¹ (Table 28) is a 12-item questionnaire that allows to evaluate the physical function. The DRI includes the following activities: dressing; outdoor walks; climbing stairs; sitting for a longer time; standing bent over a sink; carrying a bag; making a bed; running; light work; heavy work; lifting heavy objects; participating in exercise/sports. The 12 items are divided into three categories: basic daily life activities (questions 1–4); physical activities (questions 5–8); work-related/vigorous activities (questions 9–12).

Each item is scored with a 100 mm VAS. Extremities of the scale are labelled with ‘without difficulty’ (0 points) and ‘not at all’ (100 points). Patients mark a point on the line, representing their ability to perform the daily activities included in the question list. For scoring, in each item the distance in mm on the VAS between the zero points and the point marked from the patient is measured. The mean of these measurements is calculated, and the DRI score is expressed as percentage. The DRI is a very quick self-administered questionnaire, and can be scored in less than 2 min.

Jan van Breemen functional scale

Jan van Breemen functional scale (JVB)⁶² (Table 29) quantifies back pain. It consists of three different domains: pain, functional capacity and spinal mobility. The pain component includes six questions about back pain in the past week: ‘in general’, ‘at night’, ‘during the first hour in the morning’, ‘during sitting’, ‘during walking’ and ‘during

Table 28 The disability rating index.

Disability rating index	
How do you manage the following activities? For each question, please mark one point on the line	
1. Dressing (without help)	Without difficulty--Not at all
2. Out-door walks	Without difficulty--Not at all
3. Climbing stairs	Without difficulty--Not at all
4. Sitting longer time	Without difficulty--Not at all
5. Standing bent over a sink	Without difficulty--Not at all
6. Carrying a bag	Without difficulty--Not at all
7. Making a bed	Without difficulty--Not at all
8. Running	Without difficulty--Not at all
9. Light work	Without difficulty--Not at all
10. Heavy work	Without difficulty--Not at all
11. Lifting heavy objects	Without difficulty--Not at all
12. Participating in exercise/sports	Without difficulty--Not at all

Table 29 The Jan van Breemen functional scale.

Jan van Breemen functional scale											
<i>Pain scores</i>											
How much backache did you suffer during the last week?											
1. In general	0: no pain	1	2	3	4	5	6	7	8	9	10: worst pain possible
2. At night	0: no pain	1	2	3	4	5	6	7	8	9	10: worst pain possible
3. During the first hour in the morning	0: no pain	1	2	3	4	5	6	7	8	9	10: worst pain possible
4. During sitting	0: no pain	1	2	3	4	5	6	7	8	9	10: worst pain possible
5. During Walking	0: no pain	1	2	3	4	5	6	7	8	9	10: worst pain possible
6. During standing	0: no pain	1	2	3	4	5	6	7	8	9	10: worst pain possible
<i>Functional capacity scores</i>											
How well were you able to during the last week (in relation to your back problem)?											
1. Carry	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
2. Walk	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
3. Sit	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
4. Stand	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
5. Lift	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
6. Go outdoors	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
7. Sleep	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
8. Perform household and hobby activities	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
9. Perform occupational activities	0: very bad/ impossible	1	2	3	4	5	6	7	8	9	10: very good/ normal
<i>Spinal mobility tests</i>											
1. Lumbar flexion index										 cm
2. Lumbar flexion/extension index										 cm
3. Lateral bending, fingertips to fibular head; right										 cm
4. Lateral bending, fingertips to fibular head; left										 cm
5. Lateral bending to the right; contraction										 cm
6. Lateral bending to the right; distraction										 cm
7. Lateral bending to the left; contraction										 cm
8. Lateral bending to the left; distraction										 cm
9. Active straight leg raising; right										 °
10. Active straight leg raising; left										 °

standing'. Each item is scored with an 11-point scale, ranging from 0 to 10. The functional capacity component includes eight questions about the ability to perform the following tasks during the past week: carrying, walking, standing, sitting, lifting, going outdoors, sleeping and performing household/hobby activities. Each item is also scored with a 0–10 scale. The lumbar spine mobility component is measured with the following tests: lumbar flexion index; lumbar flexion/extension index; lateral bending, fingertips to fibular head (right/left); lateral bending to the right/left, contraction; lateral bending to the right/left, distraction; active straight leg raising (right/left).

The complete JVB (questionnaire and physical test) requires about 20 min.

Table 30 The occupational role questionnaire.

The occupational role questionnaire				
The following questions ask about the way your back pain may interfere with your job. To answer each question, please mark one box.				
<i>Would you say that, because of back pain,</i>	<i>A lot</i>	<i>Somewhat</i>	<i>A little</i>	<i>Not at all</i>
	(3)	(2)	(1)	(0)
1. You cut down on the amount of extra work or overtime?				
2. You work more slowly?				
3. You take more frequent or longer breaks?				
4. You are less able to concentrate on your work?				
5. You have fewer opportunities to upgrade your skills?				
6. You are more likely to lose your job?				
7. You have less satisfaction with your job?				
8. You need more help from your co-workers?				

The occupational role questionnaire

The occupational role questionnaire⁶³ (Table 30) is a short eight-item instrument to assess the impact of back pain in workers. It consists of two sections: productivity and satisfaction. The productivity component includes four questions about extra work, ability to work quickly, productivity/efficiency and quality of work. The satisfaction component includes four questions about opportunities to improve one's skills, job security, job satisfaction and relations with co-workers. Each of eight item is answered with four possible responses: 'a lot' (scored with 3 points); 'somewhat' (scored with 2 points); 'a little' (scored with 1 point) or 'not at all' (scored with 0 points). The final score is calculated adding up item scores and it is converted to a 0–100 scale. It is also possible to obtain two subscores, one for productivity section and one for satisfaction section. Each of them is calculated with the same format of the final ODQ score.

The spinal pain independence measure

The spinal pain independence measure⁶⁴ (Table 31) is designed to assess the chronic LBP. It consists of three sections: activities related to mobility, activities performed in sitting and standing and activities performed in the room and bathroom. The mobility section includes five items: mobility for short distances, mobility for moderate distances, mobility for long distances, stair management and maximal walking speed. The activity in sitting and standing section includes three items: carrying loads, activity in the sitting position and activity in the

Table 31 The spinal pain independence measure.

Spinal pain independence measure		
Item	Answer	Score
<i>Mobility</i>		
1. Mobility for short distances (indoors)	Lies constantly in bed	0
	Moves independently in a wheelchair	1
	Moves with a forearm frame	2
	Walks with a walking frame	3
	Walks with crutches	4
	Walks with two canes	5
	Walks with one cane or a leg orthosis	6
	Walks without aids	7
2. Mobility for moderate distances (10–100 m)	Unable to walk	0
	Walks with a walking frame	1
	Walks with crutches or canes on a paved and flat at surface	2
	Walks with leg orthosis or without aids on a paved surface	3
	Walks with canes or crutches on an uneven surface	4
	Walks with one cane or orthosis on an uneven surface	5
	Walks without aids on a paved surface and/or needs short breaks	6
	Walks without aids on an uneven surface	7
3. Mobility for long distances (more than 100 m)	Unable to walk	0
	Walks with a walking frame	1
	Walks with crutches or canes on a paved and flat at surface	2
	Walks with leg orthosis or without aids on a paved surface	3
	Walks with canes or crutches on an uneven surface	4
	Walks with one cane or orthosis on an uneven surface	5
	Walks without aids on a paved surface and/or needs short breaks	6
	Walks without aids on an uneven surface	7
4. Stair management	0. Unable to climb or descend stairs	0
	1. Climbs one or two steps in treatment session only	1
	2. Climbs and descends three steps with support or supervision of another person	2
	3. Climbs and descends three steps with support of handrail and/or crutch/cane	3
	4. Climbs and descends a staircase with support of handrail and/or crutch/cane	4
	Climbs and descends a staircase without support	5

Continued

Table 31 Continued

Spinal pain independence measure		
Item	Answer	Score
5. Maximal walking speed (in the maximal distance subject reached)	Unable to walk	0
	Walks slowly	2
	Walks at a moderate speed	4
	Walks fast	6
<i>Activity in the sitting and standing positions</i>		
6. Carrying loads (lifting load from a chair, mark if preferred carrying with one or both hands)	Unable to carry loads	0
	Carries 1 kg for 1 min continuously	1
	Carries 2 kg for 1 min continuously	2
	Carries 2 kg for 5 min continuously	3
	Carries 4 kg for 1 min continuously	4
	Carries 4 kg for 5 min continuously	5
	Carries 6 kg for 1 min continuously	6
	Carries 6 kg for 5 min continuously	7
	Carries 8 kg for 1 min continuously	8
	Carries 8 kg for 5 min continuously	9
	Carries 10 kg for 1 min continuously	10
	Carries 10 kg for 5 min continuously	11
7. Activity in the sitting position	Incapable of activity in sitting for at least 5 min continuously	0
	Active in sitting on an adapted chair for at least 5 min continuously	2
	Active in sitting on a common chair for at least 5 min continuously	5
	Active in sitting on an adapted chair for at least 15 min continuously	8
	Active in sitting on a common chair for at least 15 min continuously	10
	Active in sitting on an adapted chair for at least 30 min continuously	13
	Active in sitting on a common chair for at least 30 min continuously	15
	Active in sitting on a common chair for at least 1 h continuously	20
8. Activity in the standing position	Incapable of activity in standing for at least 5 min continuously	0
	Active in standing for at least 5 min continuously	2
	Active in standing for at least 10 min continuously	4
	Active in standing for at least 20 min continuously	6
	Active in standing for at least 30 min continuously	8

Continued

Table 31 *Continued*

Spinal pain independence measure		
Item	Answer	Score
	Active in standing for at least 1 h continuously	12
<i>Activity indoors</i>		
9. Mobility in bed (turning in bed, raising up to sitting)	Requires total assistance	0
	Requires partial assistance	2
	Independent with adaptive devices and/or specific setting	4
	Completely independent	6
10. Transfers (from bed to chair to standing)	Requires total assistance	0
	Requires partial assistance	2
	Independent with adaptive devices and/or specific setting (external support)	4
	Completely independent	6
11. Washing lower body	Requires total assistance	0
	Requires partial assistance	2
	Independent with adaptive devices and/or specific setting (a chair, a handrail)	4
	Completely independent	6
12. Dressing lower body	Requires total assistance	0
	Requires partial assistance	2
	Independent with adaptive devices and/or specific setting (external support)	4
	Completely independent	6

standing position. The activity indoors section includes four items: mobility in bed, transfers, washing lower body and dressing lower body.

The physical impairment scale

The physical impairment scale (PIS)⁶⁵ (Table 32) is designed to measure the physical impairment in patients with LBP. It includes seven items selected from a pool of 27 physical tests by investigating reliability, ability to discriminate patients and normal subjects, and ability to express the disability. Physical tests included in the final version of PIS are the following: total flexion, total extension, average lateral flexion, average straight leg raising (SLR), spinal tenderness, bilateral active SLR and sit-up. For each item a cut-off value is established to differentiate illness subjects from normal subjects. Each item is scored with 0 points if the test value is normal, or with 1 point if the test value is pathologic. The final score of PIS ranges from 0 to 7 and it can be expressed as percentage.

Table 32 The physical impairment scale.

The physical impairment scale		
Physical test	Scores	
	0	1
Total flexion	>87°	<87°
Total extension	>18°	<18°
Average lateral flexion	>24°	<24°
Average SLR		
Female	>71°	<71°
Male	>66°	<66°
Spinal tenderness	Negative	Positive
Bilateral active SLR	>5 s	<5 s
Sit-up	>5 s	<5 s

The functional outcomes questionnaire for spinal disorders

The functional outcomes questionnaire for spinal disorders (FOQSD)⁶⁶ includes the following items: ability to perform heavy activities (such as active sports, heavy housecleaning, gardening, etc.), ability to perform light/moderate activities (such as washing, cooking, light cleaning, etc.), ability to perform activities (such as visiting friends, eating out, etc.), sitting, walking, sleeping, duration of symptoms, depression, level of pain, pain medication usage and overall satisfaction with results.

The pain response to activity and position questionnaire

The pain response to activity and position questionnaire (PRAP)⁶⁷ is a 30-item questionnaire consisting of two sections of 15 questions. One section is related to LBP and the other section is related to leg pain. In both groups of questions, for each item the patient describes his/her pain as follows: 'no pain', 'better', 'same' or 'worse'. The PRAP is a patient self-report instrument.

The back pain interference scale

The back pain interference scale⁶⁸ is an 18-item questionnaire to measure the restrictions in daily activities due to the back pain. Each question is scored with a 10-cm line scale ranging from 0 (no pain/symptoms at all) to 10 (the worst pain/symptoms). Final score vary from 0 to 180.

An analytic description for every score is presented in Table 33.

Table 33 Analytic description for every score.

Scale	Authors	Sample	Domains (items)
Roland–Morris disability questionnaire	Roland and Morris ¹⁰	Patients with low back pain aged 16–64 years from all social classes	Physical functions (walking, bending over, sitting, lying down, dressing, sleeping, self-care and daily activities);
RDQ-23	Patrick <i>et al.</i> ⁷	Patients with sciatica due to lumbar disc herniation	Physical functions
RDQ-18	Stratford and Binkley ¹⁴	Patients with low back pain of musculoskeletal origin	Physical functions
RDQ-16	Dionne <i>et al.</i> ¹⁶	Patients with low back pain aged 18–75 years	Physical functions
RDQ-two	Underwood <i>et al.</i> ¹⁷	Individuals with chronic back pain	Physical functions
RDQ-7p	Walsh and Radcliffe ¹⁸	Patients with chronic low back pain	Physical functions
RDQ-12	Atlas <i>et al.</i> , 2003 ¹⁹	Patients 18 years of age or older with sciatica due to intervertebral disc herniation or lumbar spinal stenosis	Physical functions
Oswestry disability index	Fairbank <i>et al.</i> ²⁰	Patients with low back pain	Pain intensity; personal care; lifting; walking; sitting; standing; sleeping; sex life; social life and travelling
ODI version 2.0	Baker <i>et al.</i> ²⁵	Patients with chronic low back pain	Pain intensity; personal care; lifting; walking; sitting; standing; sleeping; sex life (if applicable); social life and travelling
Revised Oswestry disability questionnaire	Hudson-Cook <i>et al.</i> ³⁰	Patients with acute or chronic low back pain	Pain intensity; personal care; lifting; walking; sitting; standing; sleeping; social life; travelling and changing degree of pain
modified ODI	Fritz and Irrgang ³¹	Patients with work-related acute low back pain due to injury of the lumbosacral spine	Pain intensity; personal care; lifting; walking; sitting; standing; sleeping; social life; travelling and employment/homemaking
AAOS/MODEMS	Fairbank, 1995 ³²	Patients with low back pain	Personal care; lifting; walking; sitting; standing; sleeping and travelling
Quebec back pain disability scale	Kopec <i>et al.</i> ³⁴	Patients with back pain	Daily tasks (self-care, sleeping, walking, climbing stairs, sitting, standing, lifting large or heavy objects, bending and stooping, physical activities and houseworks)
Waddell disability index	Waddell and Main ³⁶	Patients aged 20–55 years with low back pain or sciatica	Daily living activities (lifting, sitting, standing, travelling, walking, sleeping, social life, sex life and putting on footwear)
Million visual analogue scale	Million <i>et al.</i> , 1981 ³⁸	Patients with chronic back pain	Body functions (pain, sleep, stiffness and twisting); daily activities (walking, sitting, standing and work) and social life

Continued

Table 33 Continued

Scale	Authors	Sample	Domains (items)
Low back outcome score	Greenough and Fraser ³⁹	Patients with low back pain	Current pain; employment; domestic chores; sport activities; resting; medical treatments or consultations; drug use; sex life and daily activities (such as sleeping, walking, sitting, travelling, dressing)
Low back pain rating scale	Manniche <i>et al.</i> ⁴⁰	Patients undergone first-time lumbar surgery for disc prolapse, without re-operation	Pain (low back pain/leg pain); disability (sleeping, ability to perform houseworks, walking, sitting, lifting, working, dressing, driving, running, getting up from a chair, climbing stairs, contact with people and expectations of future pain) and physical impairment (back muscle endurance, spinal mobility, patient mobility and use of analgesics)
NASS lumbar spine outcome assessment instrument	Daltroy <i>et al.</i> , 1996 ³³	Patients with central low back pain without radiation or compression of a spinal nerve root (herniated disc syndrome) or lumbar spinal stenosis or chronic low back pain syndrome or patients undergone discectomy or decompression for spinal stenosis	Demographic data (age, sex, race, education and insurance information); medical history (diagnosis, past surgeries, comorbidities, etc.); pain, neurogenic symptoms and function; employment history; outcomes of treatment
Clinical back pain questionnaire	Ruta <i>et al.</i> ⁴³	Patients with low back pain	Body functions (pain, sleep, bending, loss of feeling and leg weakness) and daily activities (self-care, walking, sitting, standing, sport, housework and resting)
Resumption of activities of daily living scale	Williams and Myers ⁴⁴	Injured workers with acute low back pain	Sleeping patterns; sexual activity; self-care; light and heavy household chores; shopping; socializing inside and outside home; travelling; recreational activities and paid employment
Functional rating index	Feise and Menke ⁴⁵	Patients seeking professional care for spinal pain and dysfunction (cervical, thoracic, lumbar) at chiropractic practices	Daily activities (sleeping, self-care, travel, work, recreation, lifting, walking and standing) and pain (intensity and frequency)
Back pain functional scale	Stratford <i>et al.</i> ⁴⁶	Patients of ages 18–79 years affected by LBP of suspected musculoskeletal origin	Functional status of patient (work, hobbies, home activities, bending or stooping, dressing shoes or socks, lifting, sleeping, standing, walking, climbing stairs, sitting and driving)
General Function Score	Hägg <i>et al.</i> ⁵¹	Patients with chronic low back pain; patients with different low back disorders admitted for surgery; patients operated for lumbar disc herniation and patients undergone posterolateral fusion for isthmic lumbosacral spondylolisthesis; outpatients with spinal disorders	Physical activities of daily living (walking a flight of stairs; sitting more than 30 min; standing more than 30 min; walking more than 30 min; lifting more than 10 kg; lean over a basin; carry a bag of groceries; make the bed and dressing)

Patient-specific functional scale	Stratford <i>et al.</i> ⁵⁰	Patients of ages 12– 80 years with neck pain of suspected musculoskeletal origin	Pain question set; pain limitation section and pain intensity section
Outcome measure in lumbar spinal stenosis	Stucki <i>et al.</i> , 1996 ⁵⁴	Patients with low back pain and/or leg pain undergone surgery for lumbar spinal stenosis	Symptom severity (pain severity, pain frequency, pain in the back, pain in the leg, weakness, numbness and balance disturbance); physical function (walking distance, ability to walk for pleasure, for shopping, for getting around the house and from bathroom to bedroom) and patient satisfaction (overall result of the back operation, pain relief after the operation, walking ability after the operation, ability to do housework or job after the operation, strength in the thighs, legs, or feet, and balance or steadiness on feet)
Back illness pain and disability 9-item scale	Tesio <i>et al.</i> ⁵⁵	Chronic low-back pain patients with herniation or protrusion of at least one lumbar disc	Pain (aching and tiring) and mobility (lifting, sitting for 30 min, standing for 30 min, travelling, getting up from a low seat, walking and personal care)
Bournemouth questionnaire	Jennifer <i>et al.</i> ⁶⁰	Patients with back pain	Pain intensity; ability to perform daily activities and social activities; anxiety status; depression status; pain interference with work activities and pain locus control
Dallas pain questionnaire	Lawlis <i>et al.</i> , 1989 ⁴⁸	Chronic low-back pain patients of ages 21–61 years	Day-to-day activities (pain and intensity, personal care, lifting, standing, sitting, walking and sleeping); work and leisure activities (social life, travelling and vocational); anxiety-depression status (anxiety and mood, emotional control and depression) and social interest (interpersonal relationship, social support and punishing responses)
Disability Rating Index	Salén <i>et al.</i>	Patients with neck/shoulder/low-back pain	Basic daily life activities (dressing, outdoor walks, climbing stairs and sitting for a longer time); physical activities (standing bent over a sink, carrying a bag, making a bed and running) and work-related/vigorous activities (light work, heavy work, lifting heavy objects and participating in exercise/sports)

Continued

Table 33 Continued

Scale	Authors	Sample	Domains (items)
Jan van Breemen functional scale	Lankhorst <i>et al.</i> , 1982 ⁶²	Patients affected by idiopathic low back pain	Pain (back pain 'in general', 'at night', 'during the first hour in the morning', 'during sitting', 'during walking' and 'during standing'); functional capacity (carrying, walking, standing, sitting, lifting, going outdoors, sleeping and performing household/hobby activities) and lumbar spine mobility (lumbar flexion/extension; lateral bending, fingertips to fibular head (right/left); lateral bending to the right/left, contraction; lateral bending to the right/left, distraction and active straight leg raising)
Occupational role questionnaire	Kopec and Esdaile ⁶³	Individuals employed and worked with chronic back pain	Productivity (extra work, ability to work quickly, productivity/efficiency and quality of work) and satisfaction (opportunities to improve one's skills, job security, job satisfaction and relations with co-workers)
Spinal pain independence measure	Itzkovich <i>et al.</i> , 2001 ⁶⁴	Patients with chronic low back pain	Mobility (mobility for short distances, mobility for moderate distances, mobility for long distances, stair management and maximal walking speed); activity in sitting and standing (carrying loads, activity in the sitting position and activity in the standing position) and activity indoors (mobility in bed, transfers, washing lower body and dressing lower body)
Physical impairment scale	Waddell <i>et al.</i> ⁶⁵	Patients with chronic low back pain with or without referred pain into the buttock(s) or thigh(s)	Physical impairment (total flexion, total extension, average lateral flexion, average straight leg raising (SLR), spinal tenderness, bilateral active SLR and sit-up)
Functional outcomes questionnaire for spinal disorders	Nork <i>et al.</i> ⁶⁶	Patients with low back pain with or without leg pain due to degenerative spondylolisthesis with or without multilevel spinal stenosis	Ability to perform heavy activities; ability to perform light/moderate activities; ability to perform activities (such as visiting friends, eating out, etc.); sitting; walking; sleeping; duration of symptoms; depression; level of pain; pain medication usage and overall satisfaction with results
Pain response to activity and position questionnaire	Roach <i>et al.</i> ⁶⁷	Patients with low back pain	Low back pain and leg pain
Back pain interference scale	Rytokoski <i>et al.</i> ⁶⁸	Patients with chronic low back	Activities of daily living

Discussion

A wide variety of rating systems to measure functional outcomes in patients with LBP have been described in the past decades. Each of them evaluates low back performance using specific variables, including both objective and subjective criteria. Also, when the same variables are evaluated, different weight is attributed to the single domain. Interpreting these domains becomes difficult, because, even though they can be common to more than one scoring system, each stresses them in a different way. Functional status measures are usually classified as generic or disease specific.⁶⁹ Generic measures allow one to evaluate symptoms, functions or organ systems, which are not necessarily spine related; moreover they can be used in all kind of patients. Disease-specific measures assess symptoms and functional limitations related to a specific disease/condition, so in the back pain patient back-related problems are focused.⁵ Usually, physicians and researchers use both functional status measures.

Although many back pain score systems are available, the most used in clinical and research settings are: RDQ, ODI, QBPDS, WDI, MVAS, LBOS, LBPRS, NASS and CBPQ.

The RDQ is a health status measure created to assess physical disability from LBP and it is one of the most used in research or clinical settings for monitoring patients.

The RDQ is validated in English,¹⁰ French,⁷⁰ German,⁷¹ Greek,⁷² Portuguese,⁷³ Spanish,⁷⁴ Swedish,⁷⁵ Turkish,⁷⁶ Norwegian,⁷⁷ Iranian,⁷⁸ Moroccan.⁷⁹

The questionnaire is simple to complete and easily understood by patients. Patients completing the RDQ have to mark statements which describe themselves that day. The RDQ score correlate well with the data obtained from other physical function score systems, such as the QBPDS³⁴ and the ODI.²⁰ The RDQ has good construct validity, internal consistency, responsiveness and reliability.¹³ The test–retest reliability when the test–retest interval is short (24 h) is better than when the test–retest interval is long.

On the basis of the validation study conducted by Roland and Morris, the RDQ should be applied for disability assessment when there is the need to detect short-term changes in back pain or short-term changes in response to treatment. On the contrary, because of the absence of specific domains in the scale, the RDQ is inadequate when the clinicians want to assess the psychological or social problems related to the patient's LBP.¹⁰ For these reason, the RDQ should be integrated with other appropriate outcome measures when this kind of evaluation is required.

The ODI is a functional status outcome measure widely used in the clinical management of spinal disorders. It is validated in English,²⁰ Finnish,^{80,81} French,⁸² German,⁸³ Greek,⁷² Norwegian,⁷⁷ Iranian.⁷⁸ The questionnaire is quick to complete and has good construct validity, pointed out by internal consistency, responsiveness and reliability. The ODI and RDQ scores are highly correlated, with similar test–retest reliability and internal consistency.²⁵

In a recent review by Fairbank and Pynsent²¹, the authors recommend the use of ODI version 2.0 to detect meaningful changes in disability status in every day life, as when using the RDQ. However, the RDQ is recommended in patients with mild/moderate disability, whereas the ODI is recommended in patients with persistent severe disability.¹³ Moreover, unlike the RDQ, the ODI allows one to investigate the patient's social problems and sexual life.

The QBPDS is a condition-specific instrument,³⁴ which assesses only functional disability and sleep, while it does not evaluate pain. The QBPDS is validated in English, Dutch,⁸⁴ French³⁵ and Iranian.⁷⁸ Because of a few validated translations to other languages, it is not as often used as the RDQ or the ODI. Internal consistency, test–retest reliability and responsiveness are satisfactory.³⁴

In the validation study by Kopec *et al.*,³⁴ the QBPDS is recommended both as outcome measurement in clinical trials and as a monitor for the patients' progresses during treatment and rehabilitation programs. Furthermore, it resulted more reliable and at least as sensitive to change when compared with the ODI and RDQ, although some authors found that the test–retest reliability and responsiveness are better for the modified ODI than the QBPDS.³¹ However, in the assessment of patients affected by LBP, the QBPDS needs to be associated with an independent pain assessment tool.⁸⁵ Moreover, it does not allow to investigate patient's social and sex life, as these items are not included in the score.

The WDI is a short nine-item score system consisting of questions about daily activities. It is validated in English,³⁶ Spanish and is also available in an unvalidated French version.⁸⁶ Internal consistency is higher in the WDI than in the RDQ, but it is lower than in the ODI.⁸⁷ Responsiveness is good: the questionnaire is sensible for clinical change 4 weeks after surgery.⁴³ Following the indications given in the validation study by Waddell and Main³⁶, in clinical settings, the WDI should be associated with other functional scoring systems to obtain a more complete assessment of disability by evaluating daily living activities commonly restricted by LBP.

The MVAS is a 15-item questionnaire evaluating disability and pain intensity in patients affected by LBP. The main advantage of MVAS scale is that it is easy to use. Despite its good reliability and internal

consistency, it should be applied only when previous score are not available because it has received limited validation, and some of its questions could lead to inaccurate answers. As reported in the validation study by Million *et al.*,³⁸ the correlation between results by different observers is not always satisfactory.

The LBOS is a self-reporting measure for both assessment and outcome in patients with LBP. The LBOS should be applied when physicians need a short general assessment of current or previous back pain, medical treatments, employment, daily activities, sport activities, sex life, etc. Moreover, it is helpful in clinical settings because it is easy to administer and clearly discriminates between pain and disability.⁸⁸ Test–retest reliability is high, the internal consistency is good⁸⁹ and it correlates well with the ODI and the WDI.⁹⁰ Nevertheless, in the LBOS score pain is assessed independently and other items are scored with different scale.⁵ In this way, there is an item-weighting bias, because the total score gives different weight to questions.⁸⁴ Moreover, the LBOS is validated in English.³⁹

The LBPRS is a rating system evaluating the clinical outcome of LBP patients in clinical settings. It assesses pain, disability and physical impairment with a good internal consistency.⁴² It is available in English and validated in Danish.⁴⁰ The score is influenced by a weighting bias due to the difference in the scoring of pain (obtained with 11-point VAS scale) and scoring of all other items (obtained with a three-point Likert scale).⁸⁸ Despite its limitations, including the small number of patients recruited for the validation study, the LBPRS score is recommended in the evaluation of functional pain.⁴²

The NASS LSO is another questionnaire designed for the assessment and outcome measurements of patients with LBP. It is validated in English,³³ German⁹¹ and Italian.⁹² It represents a complete outcome assessment in which pain is a very dominant factor assessed with several measurements. In contrast to the ODI and other LBP assessment scales, pain can be indicated clearly by using a pain locator (picture where patient has to mark the location of pain).⁸⁴ In the validation study, the authors clearly pointed out how the NASS LSO does not claim to contain the best scales at all but, given its good reliability, validity and easiness in the administration, it should be taken in consideration whenever the clinicians need to monitor patients' progress during treatment. Moreover, it allows pooling of data and it could result useful in clinical trials on LBP treatments.³³

The CBPQ, also known as the Aberdeen LBP scale, is a clinical assessment questionnaire consisting of questions about body functions and questions about daily activities. It is validated in English⁴³ and

Chinese.⁹³ Internal consistency, test–retest correlation and responsiveness are acceptable.⁴³ However, the CBPQ gives different weights to the questions, pointed out by the various answering scales. In the validation study by Ruta *et al.*⁸⁸, the CBPQ scale is meant to be used in association with a general evaluation of the patient (such as the one given by SF-36) to identify health gain that enable those who treat back pain to justify their claims on scarce resources. Nevertheless, given the structural problems previously reported, the questionnaire is of limited value.

Grotle *et al.*,⁹ according to the three ICF perspectives of health (bodily, personal and social perspective), proposed a division of LBP rating systems into four group: (i) questionnaires mainly assessing activity limitations; (ii) questionnaires mainly assessing activity limitations and few social functions; (iii) questionnaires assessing a mix of activity limitations and impairments; and (iv) questionnaires assessing items derived from all domain of functioning.

Most scores do not appear to have been constructed in a systematic fashion using recommended methodology. There is an increasing need for orthopaedic surgeons both to be familiar with and to routinely use objective measures of outcome for their procedures.⁹⁴ There is a trend towards the increased use of validated patient-based scores, but many have not been properly tested for validity, repeatability and sensitivity to change. Scores are not valid when used in a modified form and their use should be discouraged. One of the further areas of study is to compare and contrast two or more scoring scale, to ascertain whether they address the same category of low back function. In conclusion, although many scoring systems have been used to evaluate the low back function, we are still far from a single outcome evaluation system, which is reliable, valid and sensitive to clinically relevant changes, which takes into account both patients' and physicians perspective, and which is short and practical to use.

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