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# Condition-specific outcome measures for low back pain

## Part I: Validation

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**Abstract** A literature review of the nine most widely used, condition-specific, self-administered assessment questionnaires for low back pain has been undertaken. General and historic aspects, reliability, responsiveness and minimum clinically important difference, external validity, floor and ceiling effects and available languages were analysed for the nine most-used outcome tools. When considering which condition-specific measure to employ, the present overview on assessment tools should provide the necessary information to define the technical aspects of the nine questionnaires. These criteria, however, are only part

of the consideration. In part II the construction of these scales in relationship to the measurement domains will be evaluated.

**Keywords** Spine · Outcome · Assessment · Review · Low back pain

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## Introduction

The evaluation of therapies for low back pain requires consideration of a number of variables. A full evaluation is recommended to include a condition-specific disability measure, a general health measure (e.g. EQ-5D [22], WHODAS II [65], SF36 [67]), a pain measure (e.g. VAS [34]), a satisfaction measure and a measure of employment [7]. The present review is concerned with condition-specific measures.

Among a broad range of available tools, only a limited number of measurement instruments are generally known and frequently used. The application of a frequently used tool allows comparisons to be made between the study group and other populations. All currently available measures have flaws or restrictions regarding their construction, validation or application. In the absence of an ideal instrument [8], the choice of a commonly used measurement tool may be considered reasonable.

Apart from its currency of application, however, the availability, validity and responsiveness of the outcome scale are important criteria in choosing the appropriate measuring tool [45, 52, 58]. Other important, but sometimes underestimated criteria, are the characteristics of the individual questions and answers in the questionnaire [50, 58, 62]. Does the question focus on one domain or several domains? Are the sentences and questions unambiguous? Do they address performance or capacity? Are the offered answers precise and clear? Does the scoring system allow separate assessment of subscales?

The goal of this review is to compare the most common condition-specific assessment instruments for low back pain and to analyse each of these instruments separately, addressing these issues. This first paper addresses internal consistency, reliability, external validation, floor and ceiling effects, responsiveness and availability. In part II, the questionnaires will be discussed in relation to their face and construct validity and domains of measurement. Following this analysis, we aim to provide a basis for choice

when considering a self-administered assessment tool in the field of low back problems.

## Methods

Using the Internet, various medical search sites were addressed in order to find condition-specific, self-administered outcome measurements used in spine surgery (<http://www.BioMedNet.com>, <http://www.PubMed.com>, <http://www.aaos.org>, <http://www.outcomes-trust.org>, <http://www.qlmed.org>, <http://www.hoi-stratishealth.org>, <http://www.isoquol.org>, <http://www.update-software.com/Cochrane>, <http://www.mapi-research-inst.com>). Out of 82 condition-specific outcome scales, the nine most commonly used in the literature were selected (Table 1).

To quantify the use of each of these outcome tools, the number of studies evaluating or using it were determined. Measures used ten times or less in the literature were excluded from further analysis. General measures such as the SF36 [67] were not included in the search. Isolated pain measures were also excluded.

The nine scales examined were: (1) the Oswestry Disability Index (ODI), (2) the Roland–Morris Disability Questionnaire (RMDQ), (3) the Low Back Outcome Score (LBOS), (4) the Quebec Back Pain Disability Scale (QBPDS), (5) the Million Visual Analogue Scale (MVAS), (6) the Aberdeen Low Back Disability Scale (ALBDS), (7) the NASS Lumbar Spine Outcome Assessment Instrument (NASS LSO), (8) the Low Back Pain Rating Scale (LBPRS), and (9) the Waddell Disability Index (WDI).

The construction of outcome scales requires a number of considerations [58]. The measures were examined for general characteristics, reliability, internal consistency, responsiveness, correlation with other measures, floor and ceiling effects and available languages.

### General characteristics

The population from which the score was developed, number of items, items scored, whether the measure produces one single score or is divided into subscales and a brief description of the domains are provided.

### Reliability

There are a variety of ways of examining the reproducibility of a measure administered on different occasions. Test–retest reliability is the most important. It is measured best by using tests of agreement such as the kappa test [6, 45, 58]. The Pearson correlation coefficient [6] is a measure of correlation and, although commonly used, is a less reliable measure. Pearson correlation values should exceed 0.8 and kappa values should exceed 0.5. Another measure is the Bland–Altman plot [6]. This describes the spread of the score values within the same individuals between the test and the retest examination and provides a 95% confidence interval.

### Internal consistency

Measures of internal consistency are based on a single administration of the outcome measure. If the outcome measure has a relatively large number of items addressing the same dimension, such as measures of physical function, it is reasonable to expect that scores on each item would be correlated with scores on all other items. Thus, if the internal consistency is low, the different items should not be summed, because they measure different domains. Internal consistency is predominantly measured by Cronbach's alpha correlations [14]. Values above 0.8 are acceptable.

### Responsiveness to changes

The minimum clinically important difference (MCID) is the value of the change in the score which equates to the smallest change in the condition of interest the patient can detect. Responsiveness can also be evaluated using the receiver operating characteristic (ROC) curve which is constructed by calculating the sensitivity (true positive rate) and specificity (true negative rate) of the cut-off point for each of the possible score values [58]. An index of the "goodness" of the questionnaire is the area under this curve (AUC), which is usually abbreviated as D'. A poorly discriminating questionnaire has an area of 0.5 and a perfect test has an AUC of 1.0 [58].

### External validation

Comparison of a new score with existing scores allows assessment of its performance against known measures, particularly in selection of measurement domains, responsiveness and floor and ceiling effects.

### Floor and ceiling effect

Floor and ceiling effects describe the percentage of subjects which have maximal or minimal points in the score [7, 58]. Here the measure is inefficient in discriminating between subjects. A similar problem occurs when the results are skewed in a certain region. Floor and ceiling effects may be observed if a measure developed in one population, e.g. severely disabled subjects in a pain clinic, is used in a very different population, e.g. attenders in primary care.

## The nine questionnaires

### The Oswestry Disability Index (ODI)

#### General characteristics

The score was initiated in 1976 in a specialist referral clinic with a large number of chronic low back pain pa-

**Table 1** Characteristics of the nine chosen condition-specific questionnaires

Characteristic	ODI	RMDQ	LBOS	QBPDS	MVAS	ALBDS	NASS LSO	LBPRS	WDI
Existing since	1980	1982	1992	1995	1982	1994	1996	1995	1984
Items	10	24	13	20	15	19	62	21	9
Completion time	5	10	5	10	10	10	21	15	5
Med Line used	117	103	23	30	29	71	21	14	64

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# **ABERDEEN BACK PAIN SCALE**

## **Synonyms**

Aberdeen low back pain scale, Aberdeen low back pain disability scale.

## **SUMMARY**

Aberdeen low back pain disability scale is a patient-completed, disease-specific questionnaire to measure outcome in patients with low back pain. Its creators are from the University of Aberdeen and the Aberdeen Royal Infirmary in Scotland. The scale includes 19 items of how the pain affects activities like self-care, walking, sitting, standing, sport, housework, resting, bending and sleep. Contains questions on analgesia, aggravating factors, distribution of symptoms and the effect of pain on function. The questions have different number of possible responses, and each responses have graded points ranging 0 to 5. Possible total score ranges from 0 to 100. Higher scores reflect poorer health. Can be administered by post.

## **Scoring Method**

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# ABERDEEN BACK PAIN SCALE

## Structure / Content

### Question

### Response

	Pts
1. In the past 2 weeks how many days did you suffer pain in the back or leg(s)?	
none at all	0
between 1 and 5 days	1
between 6 and 10 days	2
for more than 10 days	3
2. On the worst day during the past 2 weeks how many painkilling tablets did you take?	
none at all	0
less than 4 tablets	1
between 4 and 8 tablets	2
between 9 and 12 tablets	3
more than 12 tablets	4
3. Is the pain made worse by any of the following? (Tick all that apply)	
coughing	+1
sneezing	+1
sitting	+1
standing	+1
bending	+1
walking	+1
4. Do any of the following movements ease the pain? (Tick all that apply)	
lying down	+1*
sitting down	+1*
standing	+1*
walking	+1*

**This is the end of the sample ALBDS questionnaire.  
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