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To cite this version:
Florian Bailly, Bruno Fautrel, Laure Gossec. Pain assessment in rheumatology – How can we do better? A literature review. Joint Bone Spine, 2016, 10.1016/j.jbspin.2016.01.001. hal-01288183

HAL Id: hal-01288183
https://hal.sorbonne-universite.fr/hal-01288183
Submitted on 14 Mar 2016

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Pain Assessment in Rheumatology – How Can We Do Better? A Literature Review

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Abstract

Patients’ symptoms have a place of prominence in the rheumatology landscape, and among them pain is the most conspicuous. Several pain assessment tools have been validated. One-dimensional pain scales such as visual analog scales (VASs) and numeric rating scales (NRSs) are fast to administer but have limitations that must be acknowledged. Some clinical situations require the use of multidimensional scales such as the McGill Pain Questionnaire or the Multidimensional Pain Inventory (MPI). These tools allow the assessment and management of the diverse components of pain. Here, we review the main patient-reported outcomes that can serve to evaluate pain and the psychometric properties of pain assessment tools. We also discuss the selection of the tool most appropriate for each situation (e.g., everyday practice and research).

Keywords: Pain. Patient-reported outcomes. Questionnaire. Score.
1 Introduction

Reliable pain assessments are crucial to the optimal management of patients with painful conditions. Most rheumatic diseases cause pain. Pain is both a common inaugural symptom and a major quality-of-life issue in chronic rheumatic diseases. In rheumatoid arthritis (RA), for instance, pain is the main determinant of the impact of the disease on the patient’s life. During the follow-up of patients with painful diseases, the results of pain assessments play a major role in guiding treatment decisions.

When evaluating pain, in addition to the intensity of the symptom, specific characteristics such as location and triggers must be determined. Giving careful attention to this distressing symptom both benefits the patient-physician relationship and increases the chances of achieving optimal pain relief [1].

In addition to open discussion with the patient, questionnaires designed to assess patient-reported outcomes can help in everyday practice. Familiarity with these questionnaires is also necessary to interpret the results of scientific research.

Here, we review the tools used to assess pain in patients with rheumatic diseases, their psychometric properties, and the interpretation of their results. We also discuss the selection of the tool best suited to each situation.

2 Psychometric properties of pain assessment tools

Assessment tools must be validated by studies of their metrological properties. The filter developed by methodologists working for the Outcome Measures in Rheumatology
(OMERACT) group distinguishes three metrological properties: truth, feasibility, and discriminant capacity [2,3]. The meaning of these words deserves discussion.

2.1 Truth

Truth (or validity) is the ability of the tool to accurately measure what it is designed to measure [2]. Truth is the most important metrological property.

*Face validity* reflects the subjective perception by the experts and/or patients of overall tool quality (wording and comprehension of the items, response modalities, and domains covered). *Content validity* refers to the relevance of the items and the ability of the tool to cover all the aspects of what is being measured. *Construct validity* evaluates the relevance of the various dimensions that make up the tool, i.e., the internal validity of the tool, as assessed by Cronbach’s alpha (which can range from 0 to 1). *Concurrent validity* or *criterion validity* is assessed by comparing the new tool to previously validated tools. Criterion validity reflects the correlation between results provided by the new tool and those obtained using the external reference standard.

2.2 Reliability

Reliability reflects the extent of measurement error, i.e., the consistency of the results when what is measured remains unchanged but the experimental conditions vary. A reliable measurement tool produces similar scores when used at different time points by the same observer (*test-retest reliability* or *intrarater reliability*) and when used at the same time point by different observers (*interrater reliability*). Reliability is often estimated by determining the kappa coefficient, of which values greater than 0.60 are considered to indicate good interrater agreement. Another assessment method is determination of the intraclass
correlation coefficient (ICC), which can range from 0 to 1, with 1 indicating perfect agreement.

2.3 Sensitivity to change

Sensitivity to change is the ability of a measurement tool to detect a change in clinical status between two situations or two time points. A tool that is sensitive to change reflects variations that occur between two different time points, for instance under the effect of a treatment. Discriminant capacity, in contrast, is the ability to distinguish between two different states (e.g., healthy versus ill). Discriminant capacity and sensitivity to change are particularly important for assessing treatment responses. They can be measured by computing the effect size, which is considered relevant when greater than 0.80.

2.4 Feasibility

Feasibility, or simplicity, is the objective acceptability of the tool, which depends on factors such as administration time, inconvenience to the patient, cost and/or availability of the measurement devices. Feasibility stands apart from other metrological properties, as it cannot be computed statistically, except regarding the administration time and, in some cases, the missing data rate.

3 Pain assessment questionnaires, scores, and scales

Many pain assessment questionnaires can be used in rheumatology. However, we will confine our discussion to questionnaires whose metrological properties have been validated. At least nine such questionnaires are available (Table 1). We will review their main features.
3.1 Generic one-dimensional scales

One-dimensional scales are simple to complete and can easily be used on multiple occasions. Therefore, they can serve to measure changes in pain intensity occurring spontaneously or in response to analgesic treatment. An absolute or relative cutoff can be readily defined. However, these scales fail to distinguish among the various components of pain.

3.1.1 Visual analog scale (VAS) for pain

The pain VAS is probably the most widely used self-assessment tool in everyday practice. Pain intensity is measured by placing a mark on a 10-cm long horizontal or vertical line segment that goes from “no pain” to “worst imaginable pain” [4,5]. The scale can be used in print form or as a clear ruler with a slider that the patient places at the appropriate place on the line segment, allowing the observer to read the score in millimeters on the reverse. The score is a continuous variable that can range from 0 to 100 (corresponding to the distance in millimeters between the no-pain end of the line segment and the patient’s mark). The VAS may also be graduated in centimeters and scored from 0 to 10 or colored toward increasingly bright red at the maximum-pain end of the line segment. To avoid the use by the patient of a preferred or habitual value, no words should be placed on the line segment between the two ends, and the presentation should be neutral [5].

**Metrology:** The correlation coefficients between VAS pain scores and verbal rating scale (VRS) scores range from 0.70 to 0.75 [6]. The VAS pain score is sensitive to change [7]. The minimal clinically important difference is 11 to 20 mm or a 30% score decrease, depending on the health condition [8–10].
3.1.2 Numerical rating scale (NRS)

The NRS is a one-dimensional pain assessment tool [11,12] available as several versions. The most widely used version, which is derived from the VAS, is a graduated tool marked with integers from 0 to 10, with higher numbers indicating greater pain intensity. As with the VAS, one end is marked “no pain” and the other end “worst imaginable pain” [6,11,12]. The NRS can be administered orally or as a horizontal line bearing the numbers [13]. Some patients with chronic pain prefer the NRS over the VAS [14,15].

**Metrology:** NRS scores correlate strongly (0.86 to 0.95) with VAS pain scores [6,16]. The minimal clinically important difference is 2 points or a 30% change [10].

3.1.3 Verbal rating scale (VRS)

The VRS is a Likert-type scale consisting in a ranked series of verbal descriptors such as no pain, mild pain, moderate pain, severe pain, and very severe pain [17]. However, no validated French version is available, and the variability in the number of descriptors complicates the interpretation of the results. The VRS is used chiefly in patients who are unable to use a VAS or NRS (due to poor comprehension or difficulty with abstract concepts).

**Metrology:** The results of the VAS, NRS, and VRS show correlations ranging from 0.70 to 0.75 [18,19]. However, the correlations are not linear and the three scales are not interchangeable. Furthermore, variations in the placebo effect across scale types have not been evaluated.
3.2 Multidimensional scales

Multidimensional scales provide information on the various aspects of pain, including its sensory and emotional components. However, they have longer administration and scoring times compared to one-dimensional scales.

3.2.1 The McGill Pain Questionnaire (MPQ)

The McGill Pain Questionnaire (MPQ) [20] is an English-language list of 78 verbal descriptors grouped into 20 subclasses (each of which covers one aspect of the pain). These 20 subclasses are distributed among four classes: sensory or sensory-discriminative, affective or affective-emotional, evaluative, and miscellaneous (sensory-affective). The MPQ not only evaluates pain intensity, but also provides information on many other characteristics, of which knowledge is useful in patients with chronic pain. Two other sections evaluate pain intensity and changes in the pain over time. The score can range from 0 to 78.

**Metrology:** A metaanalysis of 51 studies found that the MPQ score varied from 24% to 50% of the maximal value [21]. Reproducibility and sensitivity to change are good (Table 1) [22,23]. Validity studies in patients with different types of joint pain showed that similar descriptors were selected by patients having the same health condition and that the number of selected descriptors correlated with the VAS score [24]. Nevertheless, the MPQ uses a rich vocabulary and is therefore not suitable for patients with a low level of literacy. No cutoff has been determined to assist in interpreting the results.

3.2.2 The Short-Form McGill Pain Questionnaire (SF-MPQ)

The Short-Form McGill Pain Questionnaire (SF-MPQ) uses only 15 descriptors from the full-length version [25] (11 in the sensory class and 4 in the affective class), one item on
pain intensity, and a VAS for pain (Appendix 1). Each descriptor is rated on a 4-point intensity scale (0, absent; 1, mild; 2, moderate; and 3, severe). The maximum score is 60 points, and no cutoff has been determined. The administration time is shorter than for the full-length MPQ (2-5 minutes versus 5-15 minutes).

**Metrology:** In two different populations, the correlation coefficient between the MPQ and SF-MPQ ranged from 0.67 to 0.87 [26]. Internal consistency in patients with fibromyalgia or RA was 0.73 to 0.89 [26]. Sensitivity to change and content validity varied across health conditions [27].

### 3.2.3 The Saint-Antoine Pain Questionnaire

This tool is a modified French version of the MPQ [27]. It is composed of 61 descriptors grouped into 17 subclasses including 9 sensory, 7 affective, and 1 evaluative. The results are heavily dependent on the sociocultural background and verbal expression skills of the patient.

**Metrology:** Content validity is similar to that of the full-length MPQ [28]. A short 15-item version has been developed and is awaiting evaluation [28] (Appendix 2).

### 3.2.4 The West Haven-Yale Multidimensional Pain Inventory (WHYMPI)

A validated French version of the West Haven-Yale Multidimensional Pain Inventory (WHYMPI) is available. This 49-item tool evaluates several dimensions of the impact of chronic pain including patient experience with the pain, perceived support from the significant other (usually the spouse), and daily activities [29,30]. Three coping categories have been suggested: dysfunctional, interpersonally distressed, and minimizers/adaptive copers [31].

**Metrology:** The metrological properties seem satisfactory (Table 1) [22,32,33].
3.2.5  The Short Form 36 Bodily Pain Scale (SF-36 BPS)

The Short Form 36 Bodily Pain Scale (SF-36 BPS) is one of the eight subscales of the SF-36, a generic quality-of-life scale of which a validated and copyrighted French version is available [34]. The two SF-36 BPS items evaluate pain intensity on a six-grade Likert scale and the impact of the pain on normal work on a five-grade Likert scale. The score is computed by summing the subscores on each item then converting the result to a value on a 0-100 scale.

**Metrology:** The SF-36 has demonstrated good psychometric properties [35,36]. However, the SF-36 BPS subscale has not been evaluated separately.

3.2.6  Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP)

The measure of Intermittent and Constant Osteoarthritis Pain (ICOAP) is a multidimensional tool specifically designed to assess pain due to osteoarthritis [37]. It evaluates pain intensity, frequency, and impact on mood, sleep, and quality of life, independently from disability. The French version has been validated [38]. Five items assess constant pain and six intermittent pain. The total score based on all 11 items is computed.

**Metrology:** The validity [39] and sensitivity to change of the ICOAP have been established. Experience with this recently introduced tool is still limited.

4 Discussion

An accurate and appropriate assessment of pain allows clinicians to develop an individually tailored management strategy. Pain assessment tools in French are available on
the website of the French Society for Pain Assessment and Treatment (Société Française d’Etude et de Traitement de la Douleur, http://www.sfetd-douleur.org/adulte [40]).

One-dimensional tools such as the VAS, NRS, and VRS are fast and easy-to-use instruments for evaluating pain intensity. The validity of these three tools is similar in literate patients, but ease of administration and sensitivity to change are somewhat better with the NRS [13]. In contrast, the VRS deserves preference in the very young, very elderly, and cognitively impaired [41]. For research purposes, the NRS is preferable because it can be administered either on paper or orally. None of these one-dimensional scales provides a comprehensive assessment of the pain component. However, their fast administration allows them to be used for repeated self-assessments. Completing a NRS at regular intervals (e.g., once a week) between two physician visits, particularly using electronic tools (e.g., websites), may improve the evaluation of the patient’s pain experience. Nevertheless, in the medium term, many patients may be unwilling to perform regular self-assessments [42]. Also, repeated pain assessments might induce changes in the pain, particularly an increase in pain intensity. This increase may be promoted by the trivialization of repeated numerical ratings. The optimal frequency of pain assessments has not been determined and may constitute a relevant area for future research.

Furthermore, behavioral changes due to the knowledge that one is being observed or studied (Hawthorne effect) may lead to a decline in pain intensity [43]. One factor that may influence the Hawthorne effect is the personality of the evaluator.

When using a VAS or NRS, some patients report a pain intensity of 10/10 despite appearing to be free of distress. This puzzling behavior suggests an attempt to reflect the multidimensional components and consequences of pain in the one-dimensional assessment by indicating a higher pain intensity. For instance, the score assigned by the patient may be intended to reflect not only the intensity, but also the duration of the pain and its impact on
psychological well-being or function. These apparently paradoxical score results indicate a need for using a multidimensional tool in order to capture the many aspects of the pain experience.

In studies that focus specifically on pain, multidimensional questionnaires are often given preference over one-dimensional tools. The MPQ and its French equivalent (Saint Antoine Pain Questionnaire) are widely used in research to measure not only the intensity, but also the type of pain. The SF-36 and SF-36 BPS are useful for assessing pain within the overall setting of health and quality of life and for comparing different populations. In contrast to the Saint-Antoine Pain Questionnaire, the SF-36 BPS is sufficiently simple to be suitable for use in everyday clinical practice. Specific questionnaires such as the ICOAP provide detailed assessments in patients with specific diseases, both in clinical practice and research studies.

An important consideration is the appropriateness of the questionnaire for the cognitive and intellectual status of the patient. In patients who are unable to communicate verbally, options include the DOLOPLUS and ALGOPLUS questionnaires [44] and the Faces Pain Scale. However, detecting difficulties with abstract concepts or subtle cognitive impairments may be difficult. This point is relevant to all patient-reported outcomes. A study from Great Britain of 10 patient-reported outcome questionnaires used in rheumatology found that 22% of the participants would be unable to complete any of the questionnaires [45].

In conclusion, a formal pain assessment is an indispensable first step in the management of patients with pain. In this article, we have reviewed the main validated pain assessment tools and discussed the selection of the best tool for each specific situation. We hope this review will help clinicians gain familiarity with pain assessment issues in clinical practice and research.

**Disclosure of interest:** None of the authors has any conflicts of interest to declare.
References


[22] Burckhardt CS, Jones KD. Adult measures of pain: The McGill Pain Questionnaire (MPQ), Rheumatoid Arthritis Pain Scale (RAPS), Short-Form McGill Pain Questionnaire (SF-
MPQ), Verbal Descriptive Scale (VDS), Visual Analog Scale (VAS), and West Haven-Yale Multidisciplinary Pain Inventory. Arthritis Rheum 2003;49:S96–104.


<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Number of items</th>
<th>Administration time</th>
<th>Validated French version available</th>
<th>Reproducibility</th>
</tr>
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<tr>
<td>Visual analog scale for pain</td>
<td>1</td>
<td>&lt; 1 minute</td>
<td>Yes</td>
<td>R=0.93 in literate and R=0.71 in illiterate patients [16]</td>
</tr>
<tr>
<td>Numeric rating scale</td>
<td>1</td>
<td>&lt;1 minute</td>
<td>N/A</td>
<td>R=0.95 [16]</td>
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<tr>
<td>Verbal rating scale</td>
<td>1</td>
<td>&lt;1 minute</td>
<td>Not validated</td>
<td>R=0.82 [16]</td>
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<tr>
<td>McGill Pain Questionnaire</td>
<td>79</td>
<td>5-10 minutes</td>
<td>Not validated</td>
<td>R=0.59 to 0.81 [46]</td>
</tr>
<tr>
<td>Short-form McGill Pain Questionnaire</td>
<td>15</td>
<td>2-5 minutes</td>
<td>Not validated</td>
<td>R=0.75 to 0.93 [47]</td>
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<tr>
<td>Saint-Antoine Pain Questionnaire</td>
<td>61</td>
<td>Not evaluated</td>
<td>Yes</td>
<td>Not evaluated</td>
</tr>
<tr>
<td>Multidimensional Pain Inventory</td>
<td>49</td>
<td>5-10 minutes</td>
<td>Yes</td>
<td>R=0.62 to 0.91 [22]</td>
</tr>
<tr>
<td>Short Form 36 Bodily Pain Scale</td>
<td>2</td>
<td>&lt;2 minutes</td>
<td>Yes</td>
<td>R=0.78 [48]</td>
</tr>
<tr>
<td>Measure of Intermittent and</td>
<td>11 items</td>
<td>&lt;10 minutes</td>
<td>Yes</td>
<td>R=0.85 [49]</td>
</tr>
</tbody>
</table>
Table 1: Features of the main pain assessment questionnaires: number of items, administration time, validation of a French version, and reproducibility

<table>
<thead>
<tr>
<th>Constant Osteoarthritis Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
5 Appendices

5.1 Appendix 1: Short Form McGill Pain Questionnaire

### SHORT-FORM McGILL PAIN QUESTIONNAIRE

**RONALD MELZACK**

<table>
<thead>
<tr>
<th>PATIENT'S NAME: __________________________</th>
<th>DATE: __________</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONE</strong></td>
<td><strong>MILD</strong></td>
</tr>
<tr>
<td>THROBBING</td>
<td>0)</td>
</tr>
<tr>
<td>SHOOTING</td>
<td>0)</td>
</tr>
<tr>
<td>STABBING</td>
<td>0)</td>
</tr>
<tr>
<td>SHARP</td>
<td>0)</td>
</tr>
<tr>
<td>CRAMPING</td>
<td>0)</td>
</tr>
<tr>
<td>GNAWING</td>
<td>0)</td>
</tr>
<tr>
<td>HOT-BURNING</td>
<td>0)</td>
</tr>
<tr>
<td>ACHING</td>
<td>0)</td>
</tr>
<tr>
<td>HEAVY</td>
<td>0)</td>
</tr>
<tr>
<td>TENDER</td>
<td>0)</td>
</tr>
<tr>
<td>SPLITTING</td>
<td>0)</td>
</tr>
<tr>
<td>TIRING-EXHAUSTING</td>
<td>0)</td>
</tr>
<tr>
<td>SICKENING</td>
<td>0)</td>
</tr>
<tr>
<td>FEARFUL</td>
<td>0)</td>
</tr>
<tr>
<td>PUNISHING-CRUDEL</td>
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**P P I**

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<tr>
<th>NO PAIN</th>
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<td>0 NO PAIN</td>
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<td></td>
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<tr>
<td>1 MILD</td>
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<td>2 DISCOMFORTING</td>
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<td>5 EXCRUCIATING</td>
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<td>© R. Melzack, 1984</td>
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5.2 **Appendix 2: Short-form Saint-Antoine Questionnaire (French translation of MPQ)**

<table>
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<tr>
<th>Symptom</th>
<th>0 absent</th>
<th>1 faible</th>
<th>2 modéré</th>
<th>3 fort</th>
<th>4 extrêmement fort</th>
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<tr>
<td>Étancements</td>
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<td>un peu</td>
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<td>beaucoup</td>
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<td>Coups de poignard</td>
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<tr>
<td>En étau</td>
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<td>Tiraillage</td>
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<tr>
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