Responsiveness of the VAS and McGill Pain Questionnaire in Measuring Changes in Musculoskeletal Pain

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Clinical Scenario

Pain, caused by injury, is one of the main reasons patients seek the guidance of health care providers. However, because pain is subjective, it may be difficult to accurately measure the pain level a patient is experiencing and observe changes over time. Pain may have negative consequences for active individuals such as athletes, including decreased functionality and loss of participation time. Therefore, it is important to determine and document pain status on a frequent basis to help reduce these outcomes. Although there are several pain scales available to clinicians, the McGill Pain Questionnaire (MPQ) and the Visual Analog Scale (VAS) are frequently used. Currently, it is unknown which outcome measurement for monitoring pain is optimal in the care of active patients. Understanding active patients’ pain levels may help sports rehabilitation clinicians in acute injury management and in determining the appropriate progression of rehabilitation.

Focused Clinical Question

In an active population, is the VAS a more responsive outcome tool than the MPQ for measuring changes in pain in patient evaluations every 24–72 hours?

Summary of Search, Best Evidence Appraised, and Key Findings

- The literature was searched for studies that investigated the responsiveness of the MPQ and VAS for measuring musculoskeletal pain in an active population.
- Two individual-cohort studies \(^1\)\(^2\) and 1 case-series study.\(^3\)
- Two studies found the VAS to be more responsive to various types of injuries than the MPQ \(^1\)\(^2\) and the VAS to be more responsive than the MPQ when both instruments were used to rate pain over the preceding 24 hours.\(^1\)
- One study found that the pain-rating indices for the MPQ and VAS were highly correlated and that both instruments were individually capable of detecting significant differences in pain ratings.\(^3\)
Clinical Bottom Line

There is moderate evidence to suggest that in an active population, the VAS may be a more responsive outcome tool than the MPQ when measuring changes in acute pain in patient assessment every 24 to 72 hours.

**Strength of Recommendation**: There is level C evidence that in an active population, the VAS is more responsive than the MPQ in measuring changes in pain over 24 to 72 hours in patient evaluations.

Search Strategy

Terms Used to Guide Search Strategy

- **Patient/Client Group**: athlete or active individual and musculoskeletal pain
- **Intervention (or Assessment)**: Visual Analogue Scale and reliability or validity
- **Comparison**: McGill Pain Questionnaire and reliability or validity
- **Outcome**: responsiveness

Sources of Evidence Searched

- Ovid/MEDLINE
- SPORTDiscus
- PubMed
- Rehabilitation Reference Center
- CINAHL
- Cochrane

Inclusion and Exclusion Criteria

**Inclusion Criteria**

- Studies investigating the measurement of acute or chronic musculoskeletal pain
- Limited to English
- Limited to humans
- Published in the last 10 years (1999–2009)

**Exclusion Criteria**

- Nonmusculoskeletal pain (eg, dental, internal medicine)
- Case studies
- Studies that measured 1 time point
Results of Search

Three relevant studies\textsuperscript{1–3} were located and categorized as shown in Table 1. One additional study investigating the clinically meaningful change of the MPQ in patients with chronic musculoskeletal pain was located, but it was not included because the results were not compared against the VAS for responsiveness.\textsuperscript{4}

Best Evidence

The studies in Table 2 were identified as the best evidence and selected for inclusion in this clinically appraised topic (CAT). These studies were selected because they evaluated the responsiveness, or the ability to detect changes in pain over time, of the VAS and MPQ with varying musculoskeletal disorders and injuries.

Implications for Practice, Research, and Future Education

The MPQ was developed to capture the multidimensional aspects of pain.\textsuperscript{2} It measures qualitative pain using 78 pain descriptors. It could also be described as a quantitative measure of pain based on the pain-rating index calculated by summing the rank values of words in all of the descriptor groups.\textsuperscript{1} Similarly, the Norwegian Short-Form MPQ (NSF-MPQ) was developed to mirror the original MPQ measure through the inclusion of 15 common Norwegian pain descriptors.\textsuperscript{2} The Visual Analog Scale (VAS) measures pain quantitatively by measuring the distance in millimeters from the left anchor of a 100-mm line to a mark made by the subject. The VAS-now and the VAS-24 are the same as the standard VAS form but refer to when the outcome measure is administered. The VAS-now measures a patient’s current pain level, whereas the VAS-24 measures a patient’s pain over the last 24 hours.\textsuperscript{1}

One study\textsuperscript{3} found that both the VAS and the MPQ were responsive in detecting clinically important changes in pain over successive days. Another study\textsuperscript{1} suggests that the VAS-24 may be more responsive than the VAS-now and MPQ for detecting changes in pain. A third study\textsuperscript{2} found that the VAS and NSF-MPQ had high sensitivity in detecting improvement, but the VAS may more accurately reflect an unchanged or worsened condition than the NSF-MPQ. One challenge in

Table 1  Summary of Study Designs of Articles Retrieved

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Study design</th>
<th>Number located</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2b</td>
<td>Individual cohort</td>
<td>2</td>
<td>Scrimshaw and Christopher\textsuperscript{1}</td>
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<td></td>
<td></td>
<td></td>
<td>Strand et al\textsuperscript{2}</td>
</tr>
<tr>
<td>4</td>
<td>Case series</td>
<td>1</td>
<td>Cleather and Guthrie\textsuperscript{3}</td>
</tr>
<tr>
<td>Study design</td>
<td>Scrimshaw and Christopher¹</td>
<td>Strand et al²</td>
<td>Cleather and Guthrie³</td>
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<tr>
<td>Participants</td>
<td>76 active individuals who had lumbar disectomy, laminectomy, or fusion (55.4 ± 16.8 y of age). Subjects were excluded from the study if they could not read English, had malignant disease, or had microdiscectomy. 5 subjects were lost at follow-up.</td>
<td>123 active adults from hospitals and outpatient clinics (musculoskeletal, 40.6 ± 9.8 y; rheumatic, 56.0 ± 16.0 y; hip and knee, 73.9 ± 7.8 y of age). Subjects were included if they had musculoskeletal, rheumatic, or hip and knee pain.</td>
<td>22 college students: 1 college athlete, 20 recreational athletes, 2 sedentary individuals (male, 24.7 ± 4.4 y; female, 24.6 ± 3.5 y of age). Subjects were eligible if they were physically ready to take part in the study, without any current pain in the nondominant arm. 1 subject was excluded because of extreme physical reaction to the exercise protocol.</td>
</tr>
<tr>
<td>Intervention investigated</td>
<td>VAS-now, VAS-24, and MPQ. The 3 pain measures were administered before surgery and readministered 1 y after the surgery. All patients completed the VAS-now to describe current pain levels and both the VAS-24 and MPQ to describe their pain over the last 24 h.</td>
<td>NSF-MPQ, current pain intensity, VAS, patient global impression of change. 69 patients with musculoskeletal pain were tested before treatment, 58 patients after 1–3 d, and 52 patients after 3.5 wk of rehabilitation. 28 patients with inflammatory rheumatic pain were tested before treatment, 25 patients were retested after 1–3 d and at follow-up after 2–3 wk of treatment. 40 patients with hip or knee pain from osteoarthritis were tested before surgery and at follow-up after 12–16 wk.</td>
<td>VAS and MPQ. Participants were each given 7 copies of both the VAS and the MPQ. Patients were asked to complete each instrument at the same time of day as the initial questionnaires, on each of the next successive days.</td>
</tr>
</tbody>
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(continued)
Main findings

The VAS-24 was significantly more responsive than the VAS-now ($P = .028$) and the MPQ ($P = .004$). The VAS-now and the MPQ had similar discriminability ($P = .706$).

Both the NSF-MPQ and VAS were responsive to detect clinically important change. The NSF-MPQ was more responsive to change in patients with rheumatic and musculoskeletal pain, and the VAS was more responsive to change in patients with hip and knee pain. Both the VAS and the MPQ were sensitive to change in pain after intervention. The VAS reflected an unchanged and worsened condition after treatment more accurately than the NSF-MPQ.

Both the VAS and the MPQ were individually capable of detecting significant differences in pain ratings over successive days ($\alpha = .05$).

Table 2 (continued)

<table>
<thead>
<tr>
<th>Study design</th>
<th>Scrimshaw and Christopher$^1$</th>
<th>Strand et al$^2$</th>
<th>Cleather and Guthrie$^3$</th>
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</thead>
<tbody>
<tr>
<td>Outcome measure</td>
<td>Responsiveness</td>
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<td>High correlation between the MPQ and the VAS, with Spearman rank correlation coefficient of 1.00, indicating no significant difference in responsiveness between the MPQ and the VAS. Both the MPQ ($\chi^2 = 91.3$) and the VAS ($\chi^2 = 109.1$) are individually capable of detecting significant differences in pain ratings over successive days ($\alpha = .05$).</td>
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<tr>
<td>Level of evidence</td>
<td>2b</td>
<td>2b</td>
<td>4</td>
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<td>Conclusion</td>
<td>The VAS-24 is more responsive in detecting clinical changes in pain over the last 24 h than the VAS-now and MPQ.</td>
<td>Both the NSF-MPQ and the VAS were responsive in detecting improvement. However, the VAS reflected an unchanged and worsened condition more accurately than the NSF-MPQ.</td>
<td>Both the VAS and the MPQ were individually capable of detecting significant differences in pain ratings over successive days.</td>
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</table>

VAS, Visual Analog Scale; MPQ, McGill Pain Questionnaire; NSF, Norwegian Short-Form.
reviewing these studies is that there were considerable differences in their designs, including timing of pain-level measurement, subject population, and the etiology of pain in subjects.

Pain-measurement tools provide valuable information to clinicians about a patient’s perception of pain. This information should be used to develop and guide patient-centered treatment programs. Improvement in outcomes measurements for determining changes in pain over time support the use of specific interventions for a particular patient at a particular time. Therefore, it is essential that clinicians regularly administer pain scales at the time of injury and with each subsequent patient follow-up evaluation. With limited evidence to determine which pain scale is most responsive and appropriate for capturing pain levels in active individuals, clinicians are encouraged to implement various outcomes tools, including the MPQ and the VAS, to obtain both qualitative and quantitative assessments of pain. However, in sports rehabilitation settings where treatment time is limited, the VAS may be more convenient to administer. The MPQ requires 5 to 10 minutes to complete, compared with the VAS, for which the patient only takes a few seconds to mark a line.

Future studies should include well-designed prospective studies that randomize subjects from the adolescent athletic population. Multigroup studies comparing different pain scales at a variety of time intervals after both acute and chronic orthopedic injury would help sports rehabilitation clinicians understand how pain levels in patients may alter the course of intervention. This CAT should be reviewed in 2 years to determine whether additions to the evidence available in the literature influence the clinical bottom line.

References