

Managing musculoskeletal complaints with rehabilitation therapy: Summary of the Philadelphia Panel evidence-based clinical practice guidelines on musculoskeletal rehabilitation interventions

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KEY POINTS FOR CLINICIANS

- The Philadelphia Panel recommends continued normal activities for acute, uncomplicated low back pain and therapeutic exercise for chronic, subacute, and postsurgical low back pain.
- The Philadelphia Panel also recommends transcutaneous electrical nerve stimulation and exercise for knee osteoarthritis.
- For chronic neck pain, the Philadelphia Panel recommends proprioceptive and therapeutic exercise.
- The Philadelphia Panel found evidence to support the use of therapeutic ultrasound in the treatment of calcific tendonitis of the shoulder.
- The main difficulty in determining the effectiveness of rehabilitation interventions is the lack of well-designed, prospective, randomized, controlled trials.

■ **OBJECTIVE** The Philadelphia Panel recently formulated evidence-based guidelines for selected rehabilitation interventions in the management of low back, knee, neck, and shoulder pain.

■ **STUDY DESIGN** The guidelines were developed with the use of a 5-step process: define the intervention, collect evidence, synthesize results, make recommendations based on the research, and grade the strength of the recommendations.

■ **POPULATION** Outpatient adults with low back, knee, neck, or shoulder pain without vertebral disk involvement, scoliosis, cancer, or pulmonary, neurologic, cardiac, dermatologic, or psychiatric conditions were included in the review.

■ **OUTCOMES MEASURED** To prepare the data, systematic reviews were performed for low back, knee, neck, and shoulder pain. Therapeutic exercise, massage, transcutaneous electrical nerve stimulation, thermotherapy, ultrasound, electrical stimulation, and combinations of these therapies

were included in the literature search. Studies were identified and analyzed based on study type, clinical significance, and statistical significance.

■ **CONCLUSIONS** The Philadelphia Panel guidelines recommend continued normal activity for acute, uncomplicated low back pain and therapeutic exercise for chronic, subacute, and postsurgical low back pain; transcutaneous electrical nerve stimulation and exercise for knee osteoarthritis; proprioceptive and therapeutic exercise for chronic neck pain; and the use of therapeutic ultrasound in the treatment of calcific tendonitis of the shoulder.

■ **KEY WORDS** Arthralgia/rehabilitation, evidence-based medicine, low back pain/rehabilitation, neck pain/rehabilitation, osteoarthritis, knee/rehabilitation, physical therapy techniques/standards, practice guidelines, shoulder pain/rehabilitation. (*J Fam Pract* 2002; 51:1042-1046)

The Philadelphia Panel evidence-based clinical guidelines on musculoskeletal rehabilitation interventions were published as 5 separate articles in the October 2001 issue of *Physical Therapy*, the journal of the American Physical Therapy Association.¹⁻⁵ Originally convened on December 17, 1999, the panel included member representatives from the American Physical Therapy Association (Andrew A.

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TABLE 1

Details of the Philadelphia Panel Classification System*

Grade	Clinical importance	Study design type
A	15%	RCT (single or meta-analysis)
B	15%	CCT or observational study (single or meta-analysis)
C	15%	RCT or CCT or observational (single or meta-analysis)
ID	NA	Insufficient or no data

*Adapted from the Philadelphia Panel Members and Ottawa Methods Group.⁵
CCT, controlled clinical trial; NA, not applicable; RCT, randomized, controlled trial.

Guccione, PT, PhD), the American College of Rheumatology (Scott M. Hasson, PT, PhD), the American Academy of Orthopedic Surgeons (John Albright, MD), the American Academy of Neurology (Bruce Dobkin, MD), the American College of Physicians (Richard Allman, MD, and Alicia Conill, MD), the Cochrane Back Group (Paul Shekelle, PhD), the American Society of Physical Medicine and Rehabilitation (Randolph Russo, MD, and Richard Paul Bonfiglio, MD), and the American Academy of Family Physicians (Jeffrey L. Susman, MD). The purpose of the group was to create evidence-based practice guidelines that identify the clinical benefit of rehabilitation interventions for low back, knee, neck, and shoulder problems. The guidelines did not address medical or pharmacologic management of these conditions. Although the guidelines primarily benefit the rehabilitation specialist (physical therapists, occupational therapists, and sports therapists), family practitioners and other primary care physicians are responsible for managing these conditions and their treatments. By knowing which rehabilitation interventions have proven clinical benefit, physicians can better coordinate a patient's care and make evidence-based decisions when ordering physical therapy. In this report, we summarize and disseminate these guidelines for specific rehabilitation modalities in the management of common conditions that cause back pain, knee pain, neck pain, or shoulder pain.

BACKGROUND

The Philadelphia Panel is not a novel evaluation of evidence-based rehabilitation interventions. Previous assessments of therapies have been published by Disorders; the Agency for Health Care Policy and Research (guidelines for low back problems); the British Medical Journal; Clinical Evidence; and the

American College of Rheumatology (guidelines for knee osteoarthritis). However, those guidelines had significant limitations or have become outdated. The Philadelphia Panel set out to provide a structured and rigorous set of evidence-based clinical guidelines for the conservative (nonsurgical) management of conditions associated with low back, knee, neck, or shoulder pain.

Professional organizations of clinicians who routinely care for patients with back, knee, neck, and shoulder pain nominated members to create the Philadelphia Panel. Panelists were nominated based on their clinical expertise and previous experience developing evidence-based guidelines. Members of the panel included an orthopedic surgeon, a rheumatologist, an internist, a physiatrist, a neurologist, a family physician, a doctorate-level researcher from the Cochrane Back Group, and 2 physical therapists. The panel chair formed a research staff to identify and screen articles and construct evidence tables for pertinent references.

DEVELOPMENT OF GUIDELINES

To provide evidence-based practice guidelines for each condition, a 5-step process was established: defining the intervention, collecting the evidence, synthesizing the results, making recommendations based on the research, and grading the strength of the recommendations. To prepare the data, systematic reviews were performed for the conditions of interest and specific interventions. Rehabilitation interventions frequently used in the care of low back, knee, neck, and shoulder pain were identified, and the patient population was defined. Therapeutic exercise, massage, transcutaneous electrical nerve stimulation (TENS), thermotherapy, ultrasound, electrical stimulation, and combinations of these therapies were included in the literature search. Evidence from randomized controlled trials and observational studies such as controlled clinical trials, cohort studies, and case-control studies was identified and analyzed. Studies were included if they had evaluated outcome measures such as pain, function, strength, range of motion, return to work, patient satisfaction, activities of daily living, or quality of life. Data from studies that included outpatient adults with vertebral disk disease, scoliosis, cancer, or pulmonary, neurologic, cardiac, dermatologic, or psychiatric conditions were excluded.

The data from pertinent articles were synthesized, and the relative clinical benefit between treatment and control groups was calculated for each condition for each intervention. The panel deemed a 15% or

greater improvement between treatment and control groups to be clinically important. Relevant studies were then graded according to the type and clinical importance of the presented data. The grading scheme is summarized in Table 1. Once the panel compiled the intervention recommendations for each condition, external review by practitioners ensured the relevance of the recommendations. Interventions with a grade of A or B were to be included in the guidelines. No grade B recommendations were made. Grade C interventions could be neither included nor excluded in the final guidelines due to lack of demonstrated clinical benefit.

Recommendations for low back pain

Low back pain results in significant socioeconomic repercussions due to the restriction of occupational activities and functional ability in the activities of daily living. Treatment goals in the care of patients with low back pain include relief from pain, reduction of muscle spasm, improvement in range of motion and strength, correction of postural problems, and improvement of functional status at work and in daily life. The care of patients with low back pain can be a very frustrating process for physicians or therapists. Use of treatment modalities with proven effectiveness can provide structure and credibility to the recovery process. The Philadelphia Panel's recommendations are summarized in Table 2.

The panel found grade A evidence for improvement in the ability to return to work with continuation of normal activity vs enforced bedrest for acute low back pain (<4 weeks). Interestingly, no clinically important benefit was shown for the continuation

of normal activity for the improvement, of pain (5% decrease) or function (10% improvement). It is important to note that the recommendations for low back pain are based on studies that excluded patients with disk involvement; therefore, the effects of continuing normal activity in patients with acute back pain and disk involvement were not assessed. The Philadelphia Panel chose not to evaluate data from studies with vertebral disk involvement in their patient population.

With regard to acute low back pain, data from randomized controlled trials demonstrated no clinically important benefit (<15% from control) of stretching or strengthening exercises, mechanical traction, or TENS. Likewise, a study of therapeutic ultrasound showed no demonstrable clinical benefit. There was poor evidence to include or exclude these modalities alone as an intervention for acute low back pain. No study with an acceptable research design was identified for thermotherapy, electrical stimulation, therapeutic massage, or electromyographic biofeedback as interventions for low back pain.

For subacute low back pain (4–12 weeks), data from randomized controlled trials showed a clinically significant improvement in pain, function, and global assessment from therapeutic exercise. Mechanical traction for subacute low back pain was given a grade C rating for patient global improvement and return to work. Consequently, there is poor evidence to include or exclude mechanical traction alone for low back pain.

The assessment of chronic low back pain (>12 weeks) identified 1 grade A guideline. Therapeutic exercise, including stretching, strengthening, and mobility exercises, resulted in clinically significant improvement in pain and function but had no clinical benefit in facilitating return to work. Mechanical traction, TENS, electromyographic biofeedback, and therapeutic ultrasound showed no clinical benefit. No studies assessed efficacy of thermotherapy, massage, or electrical stimulation.

Back pain due to prior back surgery was considered separately from other conditions. A grade A guideline was given to therapeutic exercise for pain due to prior back surgery.

Combinations of rehabilitation interventions for acute and chronic low back pain produced insufficient data to make a recommendation. Although most patients who are referred to physical therapy undergo combination

TABLE 2

Summary grid of low back pain guidelines*

Therapy	Acute	Subacute	Chronic	Postsurgery
Exercise	C	A	A	A
Continue normal activities	A	ID	ID	ID
Traction	C	C	C	ID
Ultrasound	C	ID	C	ID
TENS	C	ID	C	ID
EMG biofeedback	ID	ID	C	ID
Massage	ID	ID	ID	ID
Thermotherapy	ID	ID	ID	ID
Electrical stimulation	ID	ID	ID	ID
Combined rehabilitation modalities	ID	ID	ID	ID

*Adapted from the Philadelphia Panel Members and Ottawa Methods Group.⁴

A, benefit demonstrated; C, no benefit demonstrated; EMG, electromyographic; ID, insufficient or no data; TENS, transcutaneous electrical nerve stimulation.

therapy, the panel could not formalize a guideline for combination therapy.

Recommendations for knee pain

Chronic knee pain is one of the more common complaints presented to primary care physicians. Acute and chronic pain can be related to acute injury, osteoarthritis, overuse injuries, or knee surgery. Due to the frequency of knee pain and its tendency to improve with time, there is a need to provide clinicians with the ability to make informed decisions regarding treatment options. The panel's recommendations are summarized in Table 3.

The Philadelphia Panel identified two interventions that demonstrated grade A data for the treatment of osteoarthritis. Therapeutic exercise and TENS showed clinically important benefit for pain and patient global assessment in osteoarthritis. Thermotherapy, ultrasound, and electrical stimulation demonstrated no clinically important benefit for knee osteoarthritis. In summary, there is poor evidence to include or exclude thermotherapy, ultrasound, or electrical stimulation in the treatment of knee osteoarthritis.

With regard to knee tendonitis, the only intervention with significant data was deep transverse friction massage, which showed no clinical benefit. Patellofemoral pain also had 1 grade C intervention recommendation for the use of ultrasound. Further, preoperative exercise, thermotherapy, and TENS showed no clinical benefit for the management of postsurgical knee pain.

The remaining interventions for osteoarthritis of the knee, patellofemoral pain, tendonitis of the knee, and postsurgical pain showed insufficient evidence for the Philadelphia Panel to make guideline recommendations. The major implication of this analysis is that there is poor evidence to support the use of several widely accepted interventions in the treatment of knee pain.

TABLE 3

Therapy	Patellofemoral	Postsurgery	Osteoarthritis	Knee tendinitis
Exercise	ID	C	A	ID
TENS	ID	C	A	ID
Massage	ID	ID	ID	C
Thermotherapy	ID	C	C	ID
Ultrasound	C	ID	C	ID
Electrical stimulation	ID	ID	C	ID
EMG biofeedback	ID	ID	ID	ID
Combined rehabilitation modalities	ID	ID	ID	ID

*Adapted from the Philadelphia Panel Members and Ottawa Methods Group.³
A, benefit demonstrated; C, no benefit demonstrated; EMG, electromyographic; ID, insufficient or no data; TENS, transcutaneous electrical nerve stimulation.

TABLE 4

Therapy	Acute	Chronic
Exercise/neuro-muscular reeducation	ID	A
Traction	C	C
Ultrasound	ID	C
TENS	ID	ID
Massage	ID	ID
Thermotherapy	ID	ID
Electrical stimulation	ID	ID
EMG biofeedback	ID	ID
Combined rehabilitation interventions	ID	ID

*Adapted from the Philadelphia Panel Members and Ottawa Methods Group.²
A, benefit demonstrated; C, no benefit demonstrated; EMG, electromyographic; ID, insufficient or no data; TENS, transcutaneous electrical nerve stimulation.

Recommendations for neck pain

Acute neck pain is often associated with injury or accident, whereas chronic neck pain is related to repetitive injury. Neck pain is commonly managed with analgesics and rest, but referrals to rehabilitation are increasing. The Philadelphia Panel sought to improve the appropriate use of rehabilitation interventions for neck pain by providing evidence-based guidelines. A summary of the Panel's recommendations can be found in Table 4.

Only 8 trials met all selection criteria for the management of neck pain. Of these trials, only proprioceptive and therapeutic exercise for chronic neck pain showed clinical benefit for pain and function. The remaining studies showed no clinical benefit or insufficient data. Mechanical

traction showed no clinically important benefit in the treatment of acute or chronic neck pain. No further studies that met selection criteria were found with regard to rehabilitation interventions for neck pain. Clearly there are insufficient data in the medical literature with regard to neck pain.

Recommendations for shoulder pain

Rehabilitation specialists offer several conservative interventions for the management of shoulder pain. There are few published guidelines for the management of shoulder pain. Results of the analysis are shown in Table 5. As in the analysis of neck

pain, the Philadelphia Panel was able to develop a single recommendation with clinical benefit. Clinically important benefit was shown for ultrasound for calcific tendonitis. There was no evidence of clinically important benefit for the use of ultrasound for capsulitis, bursitis, or tendonitis.

DISCUSSION

By using a rigorous methodology, the Philadelphia Panel has created evidence-based clinical practice guidelines for low back, knee, neck, and shoulder pain rehabilitation based on the current medical literature. Despite the thorough techniques used to create the guidelines, there are methodologic limitations, as with all such reviews. The panel identified many problems with the current body of evidence in the medical literature. The main difficulty with the current literature is the lack of standardization of outcome measurements used in different studies. Future studies need to develop standards of measurement that are valid, reliable, and sensitive to changes in outcome. Further, current studies have used broad inclusion criteria and enrolled patients with diverse etiologies for their pain. Problems with selection and description of patients, definitions of conditions, and standardizations of treatments and outcome measures need to be solved to properly demonstrate benefit from a rehabilitation intervention and remove misclassification bias.

Another limitation is the inherent difficulty of studying rehabilitation interventions. The effectiveness of physical rehabilitation interventions is affected by psychosocial, physical, and occupational factors. These factors can be minimized by fully randomizing large patient groups, thus minimizing selection bias. Another difficulty with developing high-quality randomized controlled trials in the area of rehabilitation is the blinding of patients or caregivers to interventions.

In future studies, it will be necessary to specifically clarify the type and manner of an intervention, intervention intensity and duration, and progression of the intervention according to patient-specific outcomes. Further, a patient typically receives several rehabilitation interventions during a therapy session. These modalities change depending on the phase of recovery (ie, ice, rest, and compression initially, evolving to strengthening, stretching, and electrotherapy with progress). A more thorough means

TABLE 5

Summary grid of shoulder pain guidelines*

Therapy	Calcific tendonitis	Capsulitis, bursitis, tendonitis, nonspecific pain
Ultrasound	A	C
Exercise	ID	ID
TENS	ID	ID
Massage	ID	ID
Thermotherapy	ID	ID
EMG biofeedback	ID	ID
Electrical stimulation	ID	ID
Combined rehabilitation modalities	ID	ID

*Adapted from the Philadelphia Panel Members and Ottawa Methods Group.¹
A, benefit demonstrated; C, no benefit demonstrated; EMG, electromyographic; ID, insufficient or no data; TENS, transcutaneous electrical nerve stimulation.

of standardizing this progression in a patient's care is needed.

In addition, the guidelines did not address cost, patient preferences, or potential harm associated with each intervention for the specific conditions.

Overall, there is a pressing need for further work in the study of rehabilitation interventions, due especially to the increased use of physical therapy for the management of low back pain, knee pain, neck pain, and shoulder pain.

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