

# Evidence-Based Practice in Physical and Manual Therapy: Development and Content of Dutch National Practice Guidelines for Patients with Non-Specific Low Back Pain

---

*Rob A. B. Oostendorp, PhD, PT, MT*  
*Gwendolynne G. M. Scholten-Peeters, MSc, PT, MT*  
*Raymond A. H. M. Swinkels, MSc, PT, MT*  
*Geertruida E. Bekkering, PhD, PT*  
*Marcel W. F. G. J. Heijmans, MSc, PT, MT*  
*Peter A. Huijbregts, DPT, FAAOMPT, FCAMT*  
*Erik J. M. Hendriks, PhD, PT*

**Abstract:** Clinical practice in physical and manual therapy is experiencing a paradigm shift from an experience- and authority-based model to a more evidence-based model. National Practice Guidelines (NPG) are examples of this shift towards research-based knowledge. This article discusses the five steps in the development of NPGs. These steps are illustrated by a discussion of development and content of two NPGs produced recently in the Netherlands for the treatment of patients with non-specific low back pain.

**Key Words:** Evidence-based Practice, Physical Therapy, Manual Therapy, Non-specific Low Back Pain

## **Definition of National Practice Guideline (NPG)**

A clinical practice guideline can be described as a set of systematic statements that indicate to the clinician what evidence base exists for the assessment and treatment of specific patient disorders. According to Hendriks *et al*, a clinical practice guideline is based on the different phases of the physiotherapy care process, the available clinical evidence, and expert consensus. Such a guideline has been field-tested prior to dissemination and may address the performance of diagnostic and/or therapeutic interventions for persons with definitive or

suspected health-threatening conditions<sup>1</sup>. A clinical practice guideline may also address issues pertaining to the good management and administration of the profession and its members. A *National Practice Guideline* (NPG) adds to this definition in that it is a guideline developed under the auspices of a professional organization<sup>1</sup>.

Guidelines are intended to be flexible. They should be followed in most cases, but they also leave room for individual practitioner choice<sup>1</sup>. An NPG may serve the following functions<sup>1</sup>:

- To provide an up-to-date state-of-the-art document to help in making diagnostic and therapeutic decisions
- To reduce (intra- and inter-therapist) variations in clinical management
- To reduce costs for health insurance companies, government, and public health agencies
- To improve patient outcomes
- To provide a tool to formulate criteria to evaluate care

---

Address all correspondence and request for reprints to:

Rob A.B. Oostendorp  
University Medical Centre Nijmegen  
Center for Quality of Care Research  
P.O. Box 9101 / 229WOK  
6500 HB Nijmegen  
The Netherlands  
r.oostendorp@wok.umcn.nl

## ***The Need for Guidelines and the Relationship to Evidence-Based Practice***

The shift from secondary to primary health care, the aging population, and the increased complexity of pathology treated by primary care providers have all accelerated the process of *professionalization*, especially in the allied health professions. Professional health care providers need to be able to define their scope of practice regarding diagnosis and treatment. Additionally, when making justifiable choices in the allocation of limited health care resources, it is essential to know which treatments are based on scientific evidence and cost-effectiveness. As is evident from the functions of an NPG above, NPG development may play an important role in promoting both professionalization and the judicious allocation of limited health care resources.

The development of practice guidelines has many similarities with the principles of “evidence-based medicine” (EBM) as introduced by Sackett *et al*<sup>2</sup>. These authors define EBM as the process of integrating the best research evidence available with both clinical expertise and patients’ values. “Evidence-based practice” (EBP) has become a significant trend in physical and manual therapy<sup>3</sup>. In the last decade, EBP has gained enormous popularity as demonstrated by:

- The growing number of journals that focus on EBP
- The establishment of the *Cochrane Library*, a database of systematic reviews and clinical trials, and other databases (*e.g.*, *PEDRO* and *CINAHL*)
- The abundance of books, manuals, and articles making EBP accessible to clinical practice<sup>4-7</sup>

Clinical practice guidelines reflect the philosophy of EBP because they are based as much as possible on scientific evidence and they possess flexibility for the practitioner to make choices appropriate for each patient.

### ***National Practice Guidelines for Non-Specific Low Back Pain in the Netherlands***

The Dutch Institute of Allied Health Care (Nederlands Paramedisch Instituut) develops, publishes, implements, and evaluates NPGs for physical and manual therapy. The NPGs discussed in this article, *Physical Therapy for Patients with Non-Specific Low Back Pain*<sup>8</sup> and *Manual Therapy for Patients with Non-Specific Low Back Pain*<sup>9</sup> were created according to the method for guideline development issued by the Royal Dutch Society for Physical Therapy (Koninklijk Nederlands Genootschap voor Fysiotherapie). These guidelines were constructed to conform to the different stages of the patient encounter in physical and manual therapy, *i.e.*, evaluation, diagnosis, and therapy. Practicing physical and manual therapists have reviewed the NPG for clinical applicability and feasibility, and their comments were used to improve the guidelines before publication. Both guidelines provide a practical guide to physical and manual therapists for the evaluation, diagnosis, and treatment of patients with non-specific

low back pain (LBP) and are based as much as possible on scientific evidence. Where scientific evidence was not available, statements were issued based on expert consensus.

Unlike in the United States where manual therapy is included in the entry-level curriculum, in the Netherlands, manual therapy is considered a post-graduate specialization within physical therapy. The use of manual therapy is considered outside of the scope of the physical therapy NPG because manual therapy diagnosis and intervention require additional knowledge and skills acquired at the post-graduate level<sup>8</sup>. Therefore, the Dutch Society for Manual Therapy decided there was a need for a separate manual therapy guideline to supplement the physical therapy NPG<sup>9</sup>. Development of the physical therapy guideline started in 1998; this guideline was authorized and published by the Royal Dutch Society for Physical Therapy in 2001. The process of developing the manual therapy guideline was initiated in 2000. The Dutch Society for Manual Therapy authorized the guideline in 2002 and recently published the document<sup>9</sup>; an English translation is planned for the near future.

The aim of this paper is twofold. Using the two Dutch guidelines as practical examples, we will discuss the methodology (see Table 1) for developing an NPG. We will also address current EBP in the treatment of patients with non-specific LBP by discussing the content of the two guidelines.

**Table 1.** Five steps in the development of Evidence-Based Medicine National Practice Guidelines<sup>1</sup>.

#### **Steps in the development of National Practice Guidelines**

1. Selecting and defining the topic
2. Locating the *best evidence*
3. Judging the validity of the evidence
4. Implementing guidelines in clinical practice
5. Evaluating the effect of guidelines

#### **Step 1. Selecting and defining the topic**

Hendriks *et al*<sup>1</sup> outlined the following criteria for selecting a subject for the development of a clinical practice guideline:

- The subject is relevant because it impacts health care costs in terms of preventing health problems or saving these costs.
- Health care providers are awaiting a guideline because they need a state-of-the-art document on a certain subject.

- The subject concerns a problem or controversy in health care for which health care providers are seeking a solution.
- There is sufficient scientific evidence to produce a guideline.
- There is a genuine expectation that the guideline produced will fit with existing norms, values, and routines.

### Relevance

In the Netherlands, the yearly incidence and prevalence of LBP in general medical practice is 30 and 35 episodes per 1000 registered patients, respectively<sup>8,9</sup>. Of all patients with LBP, 72% are classified as having non-specific LBP. LBP has a major economic impact in the Netherlands; in the 1990s, the costs of LBP were estimated at 1.7% of the gross national product<sup>10</sup>. Indirect costs such as worker's compensation benefits and lost productivity were responsible for 93% of these costs; direct medical costs accounted for the other 7%. An estimated 7% of the total health care budget and 19% of the allied health budget is, therefore, spent on the treatment of LBP.

Physical and manual therapists in the Netherlands treat a large number of patients with non-specific LBP on referral by a physician. Of all referrals to physical therapy, 27% are for LBP<sup>8</sup>. Non-specific LBP is a more common referral diagnosis for manual therapy than for physical therapy: 32% of all manual therapy referrals are for non-specific LBP versus 14% of all physical therapy referrals<sup>9</sup>. Dutch general practitioners refer 2% of patients with acute non-specific LBP and 19% of patients with chronic non-specific LBP to a manual therapist<sup>9</sup>.

### Defining LBP

In general, LBP has been divided into *specific* and *non-specific* LBP. For the purpose of the two guidelines, specific LBP is defined as pain with a pathophysiologic or pathoanatomic substrate. Examples of pathophysiologic and pathoanatomic substrates are radicular compression, spinal stenosis, trauma, infection, osteoporosis, visceral dysfunction, inflammatory disease, tumor, or metastasis<sup>8,9</sup>. Waddell<sup>11</sup> provided a summary of "red flags" (see Table 2), biomedical factors/warning signs indicative of (serious) pathology requiring further diagnostic investigation<sup>9</sup>. Consultation with the referring physician is recommended when red flags or other indications of specific pathology are present<sup>8,9</sup>.

Many discussions have taken place regarding the definition of non-specific LBP<sup>11-13</sup>. International convention defines non-specific LBP as pain in which no disorder in the anatomical structure can be found that sufficiently accounts for the patient's complaints. Thus, non-specific LBP is a diagnosis of exclusion. The two NPG guidelines<sup>8,9</sup> used Waddell's description of "simple backache"<sup>11,14</sup> to define non-specific LBP as pain that:

- Is located in the lumbosacral region with or without referred pain in the gluteal region or thigh
- Does not have a specific anatomical substrate
- Is mechanical in nature; i.e., it may be aggravated by positions, movements, or external loads
- May be accompanied by morning stiffness
- Is not associated with signs of systemic involvement, such as fever or weight loss
- Is continuous or episodic
- Usually has an initial episode between the ages of 20 and 55

Both guidelines further subdivide non-specific LBP into an acute (0-6 weeks), a sub-acute (7-12 weeks), and a chronic category (>12 weeks), mainly to be consistent with other national guidelines on the management of non-specific LBP as developed in the Netherlands<sup>15,16</sup> and in other countries.

Table 2, Red flags indicative of serious spinal pathology<sup>11</sup>.

### Red flags

- Age of onset < 20 or > 55
- Significant trauma
- Thoracic pain
- Previous medical history of carcinoma, systemic steroids, drug abuse, HIV
- Non-mechanical pain •Systemically unwell
- Weight loss
- Persisting lumbar flexion < 5 cm
- Widespread neurological findings
- Structural deformity
- Sedimentation rate > 25
- Vertebral collapse or bone destruction on radiograph

### Framework for LBP: International Classification of Functioning, Disability, and Health

The *International Classification of Functioning, Disability, and Health* (ICF)<sup>17</sup> provides a standardized language and conceptual framework for describing health and health-related states. The ICF consists of two components, each with two parts (see Figure 1):

- **Functioning and disability**
  1. Body functions and structures
  2. Activities and participation
- **Contextual factors**
  1. Environmental factors
  2. Personal factors

The different domains of the ICF provide physical and manual therapists with insight into the health status and health problems of patients with LBP. Both components of the ICF are important for a patient's health,

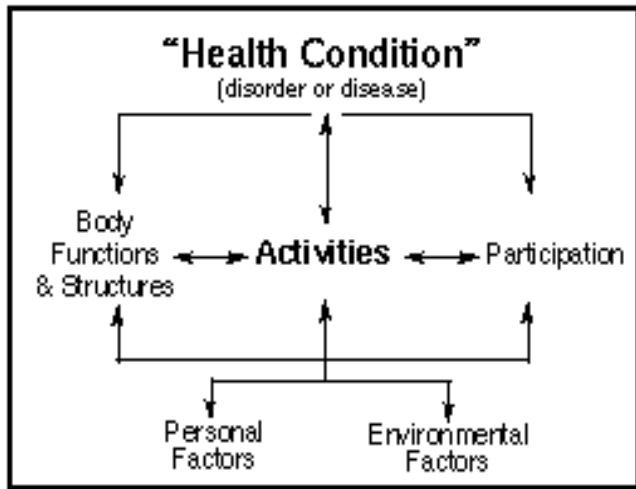


Fig. 1: Interactions between the components of the International Classification of Functioning, Disability and Health (ICF)<sup>17</sup> for patients with non-specific low back pain (LBP).

and treatment goals can be set to address the level of functioning and disability as well as the level of contextual factors. Table 3 contains definitions pertinent to the functioning and disability component of the ICF<sup>17</sup>.

Table 3. Definitions of the dimensions of health state<sup>17</sup>.

Dimensions of health state	Definitions
<b>Impairment</b>	Any loss or abnormality of body structure or of a physiological or psychological function.
<b>Activity</b>	The nature and extent of functioning at the level of the person. Activities may be limited in nature, duration, or quality.
<b>Participation</b>	The nature and extent of a person's involvement in life situations in relation to impairments, activities, health conditions, and contextual factors. Participation may be restricted in nature, duration, or quality.

In the ICF<sup>17</sup>, impairment is defined as any loss or abnormality of body structure or of a physiological or psychological function. As discussed above, a defining

factor for non-specific LBP is the absence of a clear anatomical substrate; i.e., in patients with non-specific LBP, there is by definition no loss or abnormality of body structure causing the back pain. Therefore, physical and manual therapists do not derive treatment goals from structural-anatomical impairments; instead they derive treatment goals to influence limitations in activities and restrictions in participation from impairments in physiological and psychological functions.

### Normal versus Abnormal Course of LBP

The physical and manual therapy guidelines further subdivide the acute, sub-acute, and chronic non-specific LBP categories into a normal or abnormal course based on a combination of the level of activities and participation over time and the presence of favorable or unfavorable prognostic factors. Table 4 lists favorable and unfavorable prognostic factors associated with recovery from non-specific LBP that can assist the clinician in classifying a patient's course of LBP as normal or abnormal<sup>18-25</sup>. In the normal course, activities and participation gradually increase within three weeks of the onset of non-specific LBP<sup>8,9</sup>. Note that an individual does not have to be completely symptom-free or fully participating (in work) within this three-week period. The abnormal course of non-specific LBP is defined as a situation where the level of activities and participation does not increase within three weeks' time but continues to be limited or even decreases. In most patients, this is associated with an increase in symptoms and signs.

Table 4. Prognostic factors for LBP<sup>18-25</sup>.

Favorable prognostic factors	Unfavorable prognostic factors
<ul style="list-style-type: none"> <li>• Young age</li> <li>• Low intensity of LBP</li> <li>• High level of self-efficacy (coping skills) with regards to LBP</li> <li>• Internal locus of control</li> <li>• Positive expectation of recovery of LBP</li> </ul>	<ul style="list-style-type: none"> <li>• Fear of movement (kinesiophobia)</li> <li>• Passive coping strategies</li> <li>• Reduced activity level</li> <li>• Depression</li> <li>• Catastrophizing thoughts regarding LBP</li> <li>• Reduced feeling of self-efficacy with regards to LBP</li> </ul>

It is remarkable that the prognostic factors listed in Table 4 are personal factors rather than impairments in body functions or structures. The health problem for patients with non-specific LBP can be complicated because there is growing evidence that personal and envi-

ronmental factors play a significant role in determining the course of LBP<sup>18,19,26,27</sup> (see Table 5)<sup>28</sup>. Unfavorable psychosocial prognostic factors are referred to as “yellow flags” and the presence of yellow flags indicates the need for incorporating behavioral interventions into the management approach of the patient with non-specific LBP<sup>9</sup>.

Table 5. Environmental factors for low back pain<sup>28</sup>.

<p><b>Factors related to the referring physician</b></p> <ol style="list-style-type: none"> <li>1. Age</li> <li>2. Continuing education: level, type, and amount</li> <li>3. Rural vs. urban clinic</li> <li>4. Character of the relationship with the therapist</li> </ol> <p><b>Factors related to the intervention</b></p> <ol style="list-style-type: none"> <li>1. Experience of the patient with a specific intervention</li> <li>2. Patient preference for a specific intervention</li> <li>3. Specialization of therapist</li> </ol> <p><b>Factors related to the therapist</b></p> <ol style="list-style-type: none"> <li>1. Age</li> <li>2. Education</li> <li>3. Continuing education: level, type, and amount</li> <li>4. Rural vs. urban clinic</li> </ol> <p><b>Factors related to the clinic environment</b></p> <ol style="list-style-type: none"> <li>1. Proximity of patient to the clinic</li> <li>2. Accessibility of the clinic</li> <li>3. Interior decorating style</li> <li>4. Educational material</li> <li>5. Availability of designated exercise area</li> <li>6. Availability of exercise equipment</li> </ol>
--

### *Other Prerequisites for NPG Development*

We discussed above the role of physical and manual therapists in the management of patients with non-specific LBP in the Netherlands. There still remains an obvious controversy as to the most appropriate approach to the diagnosis, management, and outcome assessment of LBP<sup>29</sup>. To date, there is an abundance of research on the management of LBP; and reliable, valid, and responsive instruments are available to measure outcomes on the level of activity and participation, e.g., the Oswestry Low Back Pain Disability Questionnaire and Quebec Back Pain Disability Scale. A shift in the management of LBP is occurring from a passive modality-based approach to a more active exercise- and education-based approach<sup>30</sup>. The two guidelines for patients with non-specific LBP were developed to provide an up-to-date guideline based on

the most recent research that reflects this shift in diagnosis, treatment, and outcome assessment.

## Step 2. Locating the *best evidence*

What is meant by *best evidence*? Evidence based on experience (*experience-based evidence*) or opinion (*authority-based evidence*) may be valuable, but it is no longer considered sufficient for the demands of contemporary physical and manual therapy practice<sup>3</sup>. Preference is given to evidence gained from the results of experimental studies. Consequently, best evidence is produced by scientific research, and the type of research question determines which study design is best. Diagnostic research is best conducted by comparing results of clinical diagnostic tests to the results of “gold standard” tests for the suspected disorder. These studies provide quantitative data on a diagnostic test in the form of values for accuracy, sensitivity, specificity, positive and negative predictive value, and positive and negative likelihood ratios<sup>31</sup>. For research into prognostic factors, a cohort study is the most appropriate design and randomized controlled trial (RCT) is the design best suited for studying treatment effects<sup>32</sup>.

Systematic reviews can be helpful for finding the best evidence. Systematic literature reviews evaluate and interpret all available research evidence relevant to a particular question. A concerted attempt is made to identify all relevant primary research, followed by a standardized appraisal of the quality of these primary studies. Studies of acceptable quality are systematically synthesized. This differs from a traditional narrative review in which previous work is described but is not identified, assessed for quality, or synthesized in a systematic fashion<sup>33</sup>.

A meta-analysis is a quantitative type of systematic review. Meta-analysis is defined as the process of using statistical methods to combine the results of different studies<sup>34</sup>. Essentially, it pools the quantitative results of different studies addressing the same research question into single estimates of the outcomes of interest (e.g., positive and negative likelihood ratios, treatment effects, etc.).

Locating and collecting scientific evidence must take place systematically<sup>35,36</sup>; this way, the chance of missing important sources (publication bias) is minimized. Locating the *best evidence* is best started by searching computerized databases, e.g., MEDLINE, CINAHL, Embase, PsychLIT, DOC-Online (www.doconline.org), PEDro, and the Cochrane Library. The Cochrane Back Review Group has recommended specific search strategies for locating systematic reviews and RCTs<sup>37</sup>.

### *Literature Search for Systematic Reviews*

For the development of the guideline *Physical Therapy for Patients with Non-Specific Low Back Pain*, articles were retrieved from MEDLINE (1982-September 2000),

CINAHL (1982-September 2000), the Cochrane Library (2000, #3), and the holdings of the Dutch Institute of Allied Health Care (up to September 2000). Search terms used were *back pain, physical therapy, behavioral therapy, massage, education, mobilization, electrotherapy, laser, ultrasound, thermotherapy, systematic review, and meta-analysis*. The members of the NPG Development committee also provided articles. Inclusion criteria for the retrieved articles were as follows:

- The articles were written in English, German, French, or Dutch.
- The design was a systematic review or a meta-analysis.
- The article dealt with the outcome of a specified intervention for patients with LBP.
- The intervention was within the scope of physical therapy practice in the Netherlands.
- The outcome measures were related to the physical functioning of the patient.

No review articles could be located for aquatic exercise; therefore, relevant RCTs were retrieved instead.

For the development of the guideline *Manual Therapy for Patients with Non-Specific Low Back Pain*, the same databases were searched up to October 2001 with the search terms *back pain, manual therapy, chiropractic, manipulation, systematic review, and meta-analysis* in the same manner as for the guideline for physical therapy.

Recent systematic reviews (*Cochrane Reviews*) noted that 39 RCTs were traced on exercise therapy for LBP<sup>38</sup>, 15 RCTs on back schools (patient education) for LBP<sup>39</sup>, six RCTs on behavioral therapy for chronic LBP<sup>40</sup>, nine RCTs on bed rest for acute LBP<sup>41</sup>, and 39 RCTs on manual therapy for LBP<sup>42,43</sup>.

### Step 3. Judging the validity of the evidence

In 1979, the *Canadian Task Force* proposed a classification system for the validity of experimental studies<sup>44</sup>. Table 6 lists the different types of therapeutic intervention studies in a descending order of validity.

Table 6. Canadian Task Force classification<sup>44</sup>.

Level of validity of therapeutic intervention studies
<ul style="list-style-type: none"> <li>• Randomized controlled trial</li> <li>• Non-randomized controlled trial</li> <li>• Observational study, e.g., cohort study and cross-sectional study</li> <li>• Uncontrolled study, e.g., patient series</li> <li>• Case description</li> </ul>

With some modifications, this classification system is still in use<sup>45</sup>. The meta-analysis with statistical pooling and the systematic review have been added to the highest category of evidence as they summarize the results of different RCTs taking into account their methodological quality. Different criteria lists have also been developed to gauge the methodological quality of an RCT<sup>45</sup>. Important criteria for methodological quality are:

- randomization
- comparison of groups after randomization
- drop-out
- (co)interventions
- blinding of researcher and, if possible, patient and therapist
- outcome measures
- intention-to-treat analysis.

### Levels of Evidence

Treatment recommendations in the two Dutch guidelines on the management of non-specific LBP are based on the conclusions of the systematic reviews and meta-analyses (and, for aquatic exercise, on the conclusions of the RCTs identified on this topic). The system used to rate the quality of the content in these reviews consisted of five levels of evidence: *Strong, Moderate, Limited, Conflicting, and No evidence* (see Table 7).

Table 7. Level of evidence randomized clinical trials (RTC)<sup>38-43</sup>.

Level of evidence	Definition
<i>Strong evidence</i>	Consistent findings in multiple high-quality RCTs
<i>Moderate evidence</i>	Consistent findings in one high-quality RCT and one or more low-quality RCTs
<i>Limited evidence</i>	Only one RCT available
<i>Conflicting evidence</i>	Inconsistent findings in multiple RCTs
<i>No evidence</i>	No RCTs

### Recommendations

Recommendations for different treatment interventions included in the guideline *Physical Therapy for Patients with Non-Specific Low Back Pain* were specifically based

on strong or moderate evidence for effectiveness and ineffectiveness. If evidence was limited or conflicting or if there was no evidence at all, no recommendations were made in favor of these interventions. Table 8 contains the levels of evidence for different physical therapy interventions for patients with non-specific LBP. In a patient with a normal course, the guideline suggests only one treatment session (with possibly a follow-up visit) consisting of patient education and advice. Exercise to reinforce the message that normal movement is beneficial rather than harmful may also be indicated. In patients with an abnormal course, the guideline again suggests patient education and advice. The NPG also suggests a varied, graduated exercise program adapted to the individual patient's ADL needs. Contact with the referral source is suggested if three weeks of therapy do not result in an increase in activities and participation<sup>8</sup>.

spine is ineffective for the treatment of acute LBP as well.

- Exercise interventions are not effective in patients with acute and sub-acute LBP.
- Exercise therapy is an appropriate intervention in patients with chronic LBP because it produces better results than no intervention.
- It is unclear which type of exercises produces superior results. Therefore, the advice is to offer a varied exercise program adapted to the patient's individual needs.

Recommendations regarding behavioral therapy are as follows:

- It is likely that behavioral therapy is useful for patients in the sub-acute phase with psychosocial indicators for a greater chance for developing chronic

Table 8. Levels of evidence for physical therapy treatment for patients with non-specific low back pain<sup>8</sup>.

Level of evidence	(Sub-) Acute low back pain (< 12 weeks)	Chronic low back pain (> 12 weeks)
Strong evidence for effectiveness of intervention	<ul style="list-style-type: none"> <li>• Advice to remain active</li> </ul>	<ul style="list-style-type: none"> <li>• Exercise</li> </ul>
Moderate or limited evidence for effectiveness of intervention		<ul style="list-style-type: none"> <li>• Behavioral therapy</li> <li>• Aquatic exercise</li> </ul>
Inconsistent evidence	<ul style="list-style-type: none"> <li>• Ultrasound</li> <li>• Electrotherapy</li> <li>• Laser</li> <li>• TENS</li> <li>• Massage</li> </ul>	<ul style="list-style-type: none"> <li>• Ultrasound</li> <li>• Electrotherapy</li> <li>• Laser</li> <li>• TENS</li> <li>• Massage</li> </ul>
Moderate evidence for ineffectiveness of intervention	<ul style="list-style-type: none"> <li>• Specific exercise</li> <li>• Traction</li> </ul>	<ul style="list-style-type: none"> <li>• Biofeedback</li> </ul>
Strong evidence for ineffectiveness of intervention	<ul style="list-style-type: none"> <li>• Bed rest</li> </ul>	<ul style="list-style-type: none"> <li>• Traction</li> </ul>

The literature reviewed for the guideline *Manual Therapy for Patients with Non-Specific Low Back Pain* was less equivocal, especially regarding the use of manual therapy consisting of mobilizations or manipulations. The guideline reports that:

- Treatment with manual therapy is likely effective for treatment of LBP.
- Manipulation is more effective for patients with acute LBP than for patients with chronic LBP.

The following recommendations coincide with those in the Physical Therapy NPG:

- Mechanical traction of the spine is ineffective for the treatment of chronic LBP.
- There are indications that mechanical traction of the

LBP and of patients with chronic LBP.

- It is unclear which type of behavioral approach is most effective, but for physical and manual therapists, operant conditioning would seem the most obvious choice for an attempt to affect movement behavior.

The manual therapy NPG follows the recommendations made in the physical therapy NPG for patients with a normal versus abnormal course of LBP. However, in the diagnostic process, an emphasis is placed on detecting the presence of impairments of joint function. In the case of a strong positive correlation between these impairments in joint function of lumbar motion segment(s) and restrictions in activities and limitations in participation, the manual therapy NPG recommends manual

therapy and specific exercise interventions aimed at resolving these impairments for patients in the acute/abnormal course, sub-acute/normal course, and chronic/normal course patient categories without “yellow flags.” Manual therapy and specific supportive exercise interventions (based on behavioral principles) may also be indicated in the sub-acute/abnormal-course and chronic/abnormal-course patient categories when indicators of “yellow flags” have decreased<sup>9</sup>.

Due to an insufficient body of relevant scientific literature, these guidelines did not make any recommendations regarding costs, cost-effectiveness, or diagnostic interventions<sup>30</sup>. In EBM, the number of recommendations regarding therapeutic interventions far outweighs the number of reviews and recommendations on diagnostic procedures<sup>46</sup>. Hernandez-Aguado<sup>46</sup> mentioned a number of possible reasons for this discrepancy:

- The analysis and presentation of diagnostic research is often mathematically complex.
- The research question in diagnostic studies is often not clearly defined.
- The study populations are frequently too heterogeneous.
- There is an emphasis on researching single tests rather than on studying all factors that contribute to a clinical diagnosis or health state.

Therefore, it was not possible to recommend diagnostic procedures except for two instruments involving measurement of disability with the aim of monitoring response to interventions<sup>8,9</sup>. The recommended instruments, *Patient Specific Complaints*<sup>47</sup> and the *Quebec Back Pain Disability Scale*<sup>48</sup>, are reliable, valid, and responsive; they are available in Dutch as well as English. The manual therapy guideline comments on the poor methodological and statistical quality of research into reliability and validity of specific manual diagnostic tests of the lumbar spine and, to a lesser extent, the sacroiliac joint.

## Step 4. Implementing guidelines in clinical practice

### *External Validity and the Individual Patient*

The usefulness of any clinical guideline is largely determined by the external validity of the scientific evidence that led to the formulation of each recommendation<sup>49-51</sup>. In other words, were the study populations, interventions, and outcome measures in the primary RCTs relevant to the patients encountered in daily clinical practice? To date, there is a gap between scientific evidence and daily clinical practice because the patient in the clinic seems to differ from the “average” patient in the RCTs<sup>52,53</sup>. This gap contributes to the apparent skepticism among clinicians regarding the implementation of clinical practice

guidelines. Advocates for EBP in physical and manual therapy need to be aware of this skepticism and explore ways to increase the implementation of clinical practice guidelines in the daily clinical practice of physical and manual therapists.

In clinical practice, many factors play a role in making clinical decisions concerning initiation, continuation, or termination of physical and manual therapy treatment. Data from scientific evidence documented in clinical practice guidelines are only part of the information used by physical or manual therapists during this decision-making process. As noted in the above-mentioned definition of EBM<sup>2</sup>, values of the patient<sup>50,54</sup> and the clinical expertise of the therapist<sup>7</sup> will determine whether the recommendations from clinical practice guidelines are applicable to an individual patient’s unique clinical situation.

### *Shared Decision-Making*

The referral behavior of general practitioners in the Netherlands for patients with LBP is another variable that can influence the implementation of the two clinical practice guidelines. The *Clinical Practice Guideline on Low Back Pain in General Medical Practice (NHG Standaard Lage-Rugpijn)* states that there is no scientific evidence for referral to physical or manual therapy in the first six weeks of an episode of LBP<sup>15</sup>. This is in contrast to the physical and manual therapy guidelines that recommend referral to therapy for patients with an abnormal course of LBP as discussed above after a period of three weeks. Most physicians adhere to this recommendation in their guideline during the first visit for LBP (20% refer to physical and manual therapy). However, at the follow-up consultations (within six weeks) for LBP, the number of physicians adhering to the guideline decreases (50% refer to physical and manual therapy)<sup>55</sup>. The physician and the patient with persistent or possibly imminent chronic LBP will continuously re-evaluate the decision regarding the referral to physical or manual therapy. Other variables may play a role in the decision to refer to physical or manual therapy, e.g., an earlier positive experience on the part of the patient with physical or manual therapy, the physician’s interpretation of the patient’s preferences, the professional contact between the physician and the therapist, or a patient’s increasingly long absence from work. The physician integrates EBP with clinical experience to make a decision to refer. It is likely that the physical and manual therapist will display behavior very similar to that of the physician when integrating clinical practice guidelines into clinical practice<sup>56</sup>.

### *Implementation*

During the development of the two guidelines, a number of elements for successful implementation were taken into account<sup>30</sup>:

- There is a clear and strong base of evidence for the recommendations contained in the guidelines.
- The content of the message in the guidelines is clear.
- The recommendations are consistent with the evidence in the guidelines.
- Continuing education is provided to incorporate the guidelines into clinical practice.
- Continuous evaluation of the guidelines is stimulated and facilitated.

The Royal Dutch Society for Physical Therapy hopes that all these efforts will stimulate therapists to read and use the guidelines in daily practice<sup>30</sup>.

## Step 5. Evaluating the effect of guidelines

The development and implementation of guidelines is an important step forward in the direction of EBP; however, evaluating the effect of guidelines is an even larger and more important step. An evaluation of the Dutch NPGs needs to address two issues:

- Are physical and manual therapists compliant with the NPGs; i.e., do they change their daily clinical practice to coincide with the recommendations presented in the NPGs?
- What is the effect of the NPG on the quality of care; i.e., does physical and manual therapy that adheres to the recommendations of the NPGs improve outcomes more than “usual care”?

Compliance with clinical practice guidelines is influenced by the method of implementation. The Center for Quality of Care Research of the University Medical Center Nijmegen has recently done a number of studies in this area with encouraging initial results<sup>51,57</sup>. Simply disseminating guidelines is usually not effective in altering the practice habits of clinicians<sup>58</sup>. While a more active approach seems to be more useful, specific characteristics of an active implementation strategy best suited for increasing physical and manual therapists' compliance with clinical practice guidelines have not been determined.

At this moment, an RCT is being carried out to explore how two different strategies for implementing the Dutch Physical Therapy NPG affect clinicians' daily practice patterns. Participating in this clinical trial are 113 physical therapists that have been randomized into two groups. The control group is receiving the NPG *Physical Therapy*

*for Patients with Non-Specific Low Back Pain* by mail (standard strategy). The experimental group is receiving additional training sessions, consisting of information about the content of the NPG, skills training, role-playing, feedback, discussion, and reminders. The results of this RCT with respect to the effectiveness of these two implementation strategies will be available near the end of 2003. The study also investigates whether adherence to the Dutch NPGs has an effect on the health outcomes in patients with non-specific LBP.

## Conclusion

The interaction between EBP and clinical experience is, in fact, an interaction between *research-based knowledge* and *experience-based knowledge*. This interaction will be the starting point for future research addressing diagnosis and treatment of patients with LBP. There are many indications that the approach to LBP in physical and manual therapy has undergone a paradigm shift<sup>59</sup>. Prospective cohort studies have shown that personal and environmental factors may play a more important role in the natural course of non-specific LBP than anatomical-structural factors. In the past, the anatomical-structural factors assumed to be the cause of LBP have received the main emphasis in diagnostic and intervention skills in both physical and manual therapy. This paradigm shift and expansion in knowledge, skills, and competencies in physical and manual therapy require a change in the approach to diagnosis and treatment for patients with non-specific LBP. Communication skills and applied behavioral therapy need to be added to existing physical and manual therapy skills. This development is due to the current scientific insights into the origin and continuation of health problems such as non-specific LBP. It is also in line with the *best evidence* for efficacy of physical and manual therapy interventions in patients with non-specific LBP.

In this article, we have discussed in five steps the development and the content of two Dutch NPGs for patients with non-specific LBP. Implementation and evaluation of these guidelines is our next challenge as is the production of a body of research to support EBP not only with regards to intervention but also in diagnosis and cost-effectiveness in the management of patients with non-specific LBP. ■

## REFERENCES

1. Hendriks HJM, *et al.* Development and implementation of national practice guidelines: A prospect for continuous quality improvement in physiotherapy. *Physiotherapy* 2000;86:535-547.
2. Sackett DL, *et al.* *Evidence-Based Medicine: How to Practice & Teach EBM*. New York, NY: Churchill Livingstone, 1997.
3. Research Committee (Victorian Branch) of the Australian Physiotherapy Association and Invited Contributors. Evidence-based practice. *Aust J Physiother* 1999;45:167-171.
4. Muir GJA. *Evidence-Based Healthcare: How to Make Health Policy and Management Decisions*. New York, NY: Churchill Livingstone, 1997.

5. Bury T, Mead J. *Evidence-Based Healthcare: A Practical Guide for Therapists*. Oxford, England: Butterworth Heinemann, 1998.
6. Silagy C, Haines A. *Evidence-Based Practice in Primary Care*. London, England: BMJ Books, 1998.
7. Jensen GM, et al. *Expertise in Physical Therapy Practice*. Boston, MA: Butterworth Heinemann, 1999.
8. Bekkering GE, et al. KNGF-richtlijn lage-rugpijn. *Ned Tijdschr Fysioth* 2001;111 (3): Supplement.
9. Heijmans WFGJ, et al. Richtlijn Manuele Therapie en Lage-Rugpijn. *Ned Tijdschr Fysioth* 2003;113(6):Supplement 1-39.
10. Hutubussy RCW, et al. Indirect costs of back pain in the Netherlands. *Pain* 1999;80:201-207.
11. Waddell G. *The Back Pain Revolution*. Edinburgh, Scotland: Churchill Livingstone, 1998.
12. Cibulka MT, Aslin K. How to use evidence-based practice to distinguish between three different patients with low back pain. *J Orthop Sports Phys Ther* 2001;31:678-688.
13. Koes BW, et al. Clinical guidelines for the management of low back pain in primary care: An international comparison. *Spine* 2001;26:2504-2513.
14. Waddell G, et al. Manual therapy rounds. *J Manual Manipulative Ther* 1998;6:151-153.
15. Faas A, et al. NHG standaard lage-rugpijn. *Huisarts Wet* 1996;39:18-31.
16. NVAB. Richtlijnen voor het handelen van de bedrijfsarts bij werknemers met lage rugklachten. Nederlandse Vereniging van Arbeids- en Bedrijfsgeneeskunde, 1999.
17. World Health Organization (WHO). *International Classification of Functioning, Disability and Health*. Geneva, Switzerland: WHO, 2001.
18. Burton AK, et al. Psychosocial predictors of outcome in acute and subacute low back trouble. *Spine* 1995;20:722-728.
19. Klenerman L, et al. The prediction of chronicity in patients with an acute attack of low back pain in a general practice setting. *Spine* 1995;20:473-477.
20. Vlaeyen JWS, Crombez G. Fear of movement/(re)injury, avoidance and pain disability in chronic low back pain patients. *Man Ther* 1999;4:187-195.
21. Al-Obaidi SM, et al. The role of anticipation and fear of pain in the persistence of avoidance behaviour in patients with chronic low back pain. *Spine* 2000;25:1126-1131.
22. Fritz JM, George SZ, Delitto A. The role of fear-avoidance beliefs in acute low back pain: Relationships with current and future disability and work status. *Pain* 2001;94:7-15.
23. Keen S, et al. Individuals with low back pain: How do they view physical activities? *Family Practice* 1999;16:39-45.
24. McGorry RW, et al. The relation between pain intensity, disability, and the episodic nature of chronic and recurrent low back pain. *Spine* 2000;25:834-841.
25. Vlaeyen JWS, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain* 2000;85:317-332.
26. Croft PR, et al. Psychologic distress and low back pain: Evidence from a prospective study in the general population. *Spine* 1995;20:2731-2737.
27. Pincus T, et al. A systematic review of psychological factors as predictors of chronicity and disability in prospective cohorts of low back pain. *Spine* 2002;27(5):E109-E120.
28. Hendriks HJM, et al. Determinants of the number of sessions per physiotherapy treatment episode. *Phys Ther* (accepted for publication).
29. Huijbregts PA. Lumbopelvic region: Anatomy and biomechanics. In: Wadsworth C, ed. *Current Concepts of Orthopedic Physical Therapy*. LaCrosse, WI: Orthopaedic Section, APTA Inc., 2001.
30. Bekkering GE, et al. Dutch Physiotherapy Guidelines for Low Back Pain. *Physiotherapy* 2003;89(2):82-96.
31. Sackett DL, Haynes RB. The architecture of diagnostic research. In: Knottnerus A, ed. *The Evidence Base of Clinical Diagnosis*. London, England: BMJ Books, 2002.
32. Guyatt G, Rennie D, eds. *Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice*. Chicago, IL: AMA Press, 2001
33. National Health and Medical Research Council. *How to Review the Evidence: Systematic Identification and Review of the Scientific Literature*. Canberra, Australia, 2000. Available at: <http://www.health.gov.au/nhmrc/publications/pdf/cp65.pdf>. Accessed March 16, 2003.
34. Meta-Analysis: The Analysis of Analyses. Website. Available at: <http://www.sunmed.org/meta.html>. Accessed March 16, 2003.
35. Helmer D, et al. Evidence-based practice: Extending the search to find material for the systematic review. *Bull Med Libr Assoc* 2001;89:346-352.
36. Shojania KG, Bero LA. Taking advantage of the explosion of systematic reviews: An efficient Medline search strategy. *Eff Clin Pract* 2001;4:157-162.
37. Tulder MW van, Cochrane Back Review Group. Method guidelines for systematic reviews. Available at: <http://www.cochrane.iwh.on.ca/method.htm>. Accessed March 15, 2003.
38. Tulder MW van, et al. Exercise therapy for low back pain (Cochrane Review). In: Cochrane Collaboration. *The Cochrane Library*. Oxford, England: Update Software, 2000 (Issue 2).
39. Tulder MW van, et al. Back schools for non-specific low back pain (Cochrane Review). In: Cochrane Collaboration. *The Cochrane Library*. Oxford, England: Update Software, 2000 (Issue 2).
40. Tulder MW van, et al. Behavioral treatments for chronic low back pain (Cochrane Review). In: Cochrane Collaboration. *The Cochrane Library*. Oxford, England: Update Software, 2000 (Issue 2).
41. Hagen KB, et al. Bed stay for low back pain and sciatica (Cochrane Review). In: Cochrane Collaboration. *The Cochrane Library*. Oxford, England: Update Software, 2000 (Issue 2).
42. Tulder MW van, Waddell G. Conservative treatment of acute and subacute low back pain. In: Nachemson AL, Jonsson E, eds. *Neck and Back Pain*. Philadelphia, PA: Lippincott, Williams & Wilkins, 2000.
43. Tulder MW van, et al. Conservative treatment of chronic low back pain. In: Nachemson AL, Jonsson E, eds. *Neck and Back Pain*. Philadelphia, PA: Lippincott, Williams & Wilkins, 2000.
44. Canadian Task Force on the Periodic Health Examination. The periodic health examination. *CMAJ* 1979;121:1193-1254.
45. Verhagen AP, et al. The art of quality assessment of RCTs included

- 
- in systematic reviews. *J Clin Epidemiol* 2001;54:651-654.
46. Hernandez-Aguado I. The winding road towards evidence-based diagnoses. *J Epidemiol Community Health* 2002;56:323-325.
47. Beurskens AJHM, Vet HCW de, Köke AJA. Responsiveness of functional status in low back pain. *Pain* 1996;65:71-76.
48. Schoppink LEM, *et al.* Reliability and validity of the Dutch adaptation of the Quebec Back Pain Disability Scale. *Phys Ther* 1996;76:268-275.
49. Craig JC, Irwig LM, Stockler MR. Evidence-based medicine: Useful tools for decision-making. *Med J Aust* 2001;175:248-253.
50. Deyo RA. A key medical decision-maker: The patient. *BMJ* 2001;323:466-467.
51. Grol R. Improving the quality of medical care: Building bridges among professional pride, payer profit, and patient satisfaction. *JAMA* 2001;284:2578-2585.
52. Wilkinson EK, *et al.* Barriers and facilitators to the implementation of evidence-based medicine in general practice: A qualitative study. *Eur J Gen Practice* 1999;5:66-70.
53. Freeman AC, Sweeney K. Why general practitioners do not implement evidence: A qualitative study. *BMJ* 2001;323:1-5.
54. Mondloch MV, Cole DC, Frank JW. Does how you do depend on how you think you'll do? A systematic review of the evidence for a relation between patients' recovery expectations and health outcomes. *CMAJ* 2001;165:174-179.
55. Schers H, *et al.* Low back pain in general practice: Reported management and reasons for not adhering to the guidelines in the Netherlands. *Br J Gen Pract* 2000;50:640-644.
56. Hendriks HJM, *et al.* The diagnostic process and indication for physiotherapy: A prerequisite for treatment and outcome evaluation. *Physical Therapy Reviews* 2000;5:29-47.
57. Schers H, *et al.* Implementation barriers for general practice guidelines on low back pain. *Spine* 2002;26:E348-E353.
58. Wensing M, Grol R. Single and combined strategies for implementing changes in primary care: A literature review. *Int J Qual Health Care* 1994;6:115-132.
59. Jones M, Edwards I, Gifford L. Conceptual models for implementing biopsychosocial theory in clinical practice. *Man Ther* 2002;7(1):2-9.