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Royal Dutch Society for Physical Therapy

# *KNGF Guideline*

## for Physical Therapy in patients with Osteoarthritis of the hip and knee

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In the context of international collaboration in guideline development, the Royal Dutch Society for Physical Therapy (Koninklijk Nederlands Genootschap voor Fysiotherapie, KNGF) has decided to translate its Clinical Practice Guidelines into English, to make the guidelines accessible to an international audience. International accessibility of clinical practice guidelines in physical therapy makes it possible for therapists to use such guidelines as a reference when treating their patients. In addition, it stimulates international collaboration in the process of developing and updating guidelines. At a national level, countries could endorse guidelines and adjust them to their local situation if necessary.

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KNGF's objective is to create the right conditions to ensure that high quality physical therapy care is accessible to the whole of the Dutch population, and to promote recognition of the professional expertise of physical therapists. KNGF represents the professional, social, and economic interests of over 20,000 members.

The guideline is summarized on a flowchart; the Practice Guidelines as well as the flowchart can be downloaded from [www.fysionet.nl](http://www.fysionet.nl).

# Contents

## Practice Guideline 1

A	Introduction	1
A.1	Target group	1
A.2	Problem definition	1
A.3	What is osteoarthritis of the hip and/or knee?	1
A.3.1	Epidemiological data	2
A.3.2	Diagnosis	2
A.3.3	General clinical characteristics	3
A.3.4	Risk factors for development and progression	3
A.3.5	Course of the disease	4
A.3.6	Health problems	4
A.4	The role of the physical therapist	4
A.5	General treatment	5
B	Diagnostic process	6
B.1	Presentation and referral	6
B.2	Direct Access to Physical Therapy	6
B.3	Initial assessment	6
B.4	Examination	7
B.4.1	Inspection	7
B.4.2	Palpation	8
B.4.3	Functional testing	8
B.5	Analysis	8
B.6	Treatment plan	8
B.7	Measurement instruments	8
C	Therapeutic process	9
C.1	General treatment characteristics	9
C.1.1	Location of treatment	9
C.1.2	Frequency and duration of treatment	9
C.2	Therapeutic methods	10
C.2.1	Supervised exercise	10
C.2.1.1	Exercise therapy	10
C.2.1.2	Hydrotherapy	10
C.2.2	Information and advice	10
C.2.2.1	Educational and self-management interventions	10
C.2.3	Manual therapy	10
C.2.3.1	Passive movements of a joint	10
C.2.3.2	Massage	10
C.2.4	Physical modalities	10
C.2.4.1	Thermotherapy	10
C.2.4.2	TENS/electrotherapy	11
C.2.4.3	Ultrasound	11
C.2.4.4	Electromagnetic field therapy	11
C.2.4.5	Low-level laser therapy	11
C.2.5	Balneotherapy (passive hydrotherapy)	11
C.2.6	Aids	11
C.2.6.1	Braces and orthoses	11
C.2.6.2	Taping	11
C.2.7	Preoperative and postoperative physical therapy for total hip and/or knee arthroplasty	11
C.2.7.1	Preoperative exercise therapy	11
C.2.7.2	Preoperative education	11
C.2.7.3	Postoperative exercise therapy	12
C.2.7.4	Continuous Passive Motion (CPM)	12

C.3	Evaluation	12
C.3.1	Aftercare	12
C.3.2	Concluding the treatment and reporting	12

Acknowledgements	12
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## **Supplements 13**

Supplement 1	Conclusions and recommendations	13
Supplement 2	Measurement instruments	20
Supplement 3	Materials for professional development	21

# Practice Guideline

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## A Introduction

This revised version of the KNGF Guideline on Osteoarthritis of the Hip and Knee offers instructions for the physical therapy treatment of persons experiencing health problems associated with osteoarthritis of the hip and/or knee. It describes the diagnostic and therapeutic process based on a methodic approach to physical therapy. This Practice Guideline is a summary of the Review of the Evidence, which sets out and explains the choices made in revising the 2001 Guideline. As is usual when revising a guideline, the revision process incorporated all recent developments relating to osteoarthritis of the hip and knee that have emerged since the publication of the previous version, in terms of treatment, research and changes in society. A number of changes have been introduced compared to the 2001 version.

Firstly, the three patient profiles have been replaced by the international Classification of Functioning, Disability and Health (ICF) Core Sets for Osteoarthritis published by the World Health Organization (WHO). The ICF is the guiding principle throughout this guideline. The classification describes the physical, mental and social health conditions or problems of persons with osteoarthritis of the hip or knee, taking into account the external and personal factors affecting these conditions and problems.

Secondly, we have undertaken an extensive systematic review of the literature on the effects of all physical therapy interventions used for patients with osteoarthritis of the hip and/or knee, including pre- and postoperative interventions.

Thirdly, we have searched the relevant literature for the most suitable assessment instruments for osteoarthritis of the hip and/or knee, to help identify health problems or evaluate treatment. These assessment instruments have been linked to the various ICF health domains.

The guideline revision process has made use of the two existing national guidelines on osteoarthritis of the hip and knee, the 2007 CBO-Richtlijn Diagnostiek en Behandeling van heup- en knieartrose (published by the Dutch Institute for Health Care Improvement CBO) and the 2008 NHG-Standaard Niet-traumatische knieproblemen bij volwassenen (published by the Dutch College of General Practitioners NHG), as well as of international guidelines and recommendations.

## A.1 Target group

This guideline is intended for physical therapists (both general physical therapists and specialists like manual therapists and psychosomatic physical therapists) who treat patients for health problems related to osteoarthritis of the hip and/or knee in a primary, secondary or tertiary care setting. The guideline is also intended for exercise therapists treating patients with osteoarthritis of the hip and/or knee.

Effective treatment of people with osteoarthritis of the hip and/or knee requires the therapist to possess specific knowledge and skills (acquired through training, work experience, and/or refresher courses or in-service training). The present KNGF Guideline on Osteoarthritis of the hip and/or knee offers physical therapists specific knowledge about the course of osteoarthritis of the hip and/or knee (including the associated pathophysiological processes), the consequences of osteoarthritis of the hip and/or knee, those consequences of osteoarthritis of the hip and/or knee that can be modified by physical therapy, and information about the diagnostic and therapeutic process, including a survey of the most relevant clinical research literature.

## A.2 Problem definition

This guideline describes the diagnostic process (including screening) and therapeutic process for physical therapy for people with osteoarthritis of the hip and/or knee, as well as pre- and postoperative care associated with surgical interventions for osteoarthritis of the hip and/or knee. This KNGF guideline specifically concerns osteoarthritis of the hip and/or knee, not osteoarthritis of other joints, like those of the spine and hands.

## A.3 What is osteoarthritis of the hip and/or knee?

Osteoarthritis, the most common disorder of the musculoskeletal system, is characterized by a slowly and intermittently progressive loss of cartilage from joints. In addition, there may be changes to the subchondral bone and proliferation of the bone at the margins of the joint (osteophyte formation). The synovial membrane may be periodically irritated, inducing inflammation of the joint.

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### A.3.1 Epidemiological data

The number of people suffering from osteoarthritis of the hip and/or knee in the Netherlands on 1 January 2007 was estimated at 197,000 men and 353,000 women, corresponding to a prevalence of 24.5 per 1000 men and 42.7 per 1000 women. Osteoarthritis of the knee is more common than osteoarthritis of the hip. The annual number of new patients with osteoarthritis of the hip and/or knee in the Netherlands was estimated in 2007 as 23,100 men and 42,900 women, corresponding to an incidence of 2.8 per 1000 men and 5.1 per 1000 women. The risk of osteoarthritis increases with age, showing a peak around the age of 78 to 79 years, after which the risk decreases again.

Each year, 4.3 percent of the people who present to their family doctor with osteoarthritis of the hip and/or knee are referred to a physical therapist. Many people suffering from osteoarthritis are not known as such to their family physician, and since the prevalence and incidence of osteoarthritis were estimated from primary care registration systems, the true number of persons with osteoarthritis of the hip and/or knee in the general population is 2 to 3.5 times higher than the number known to primary care physicians.

Based on demographic trends alone, the absolute number of people with osteoarthritis is expected to rise by almost 40 percent between 2000 and 2020. In view of the expected rise in the number of severely overweight people (with a Body Mass Index > 30), the actual future prevalence of osteoarthritis may be even higher.

### A.3.2 Diagnosis

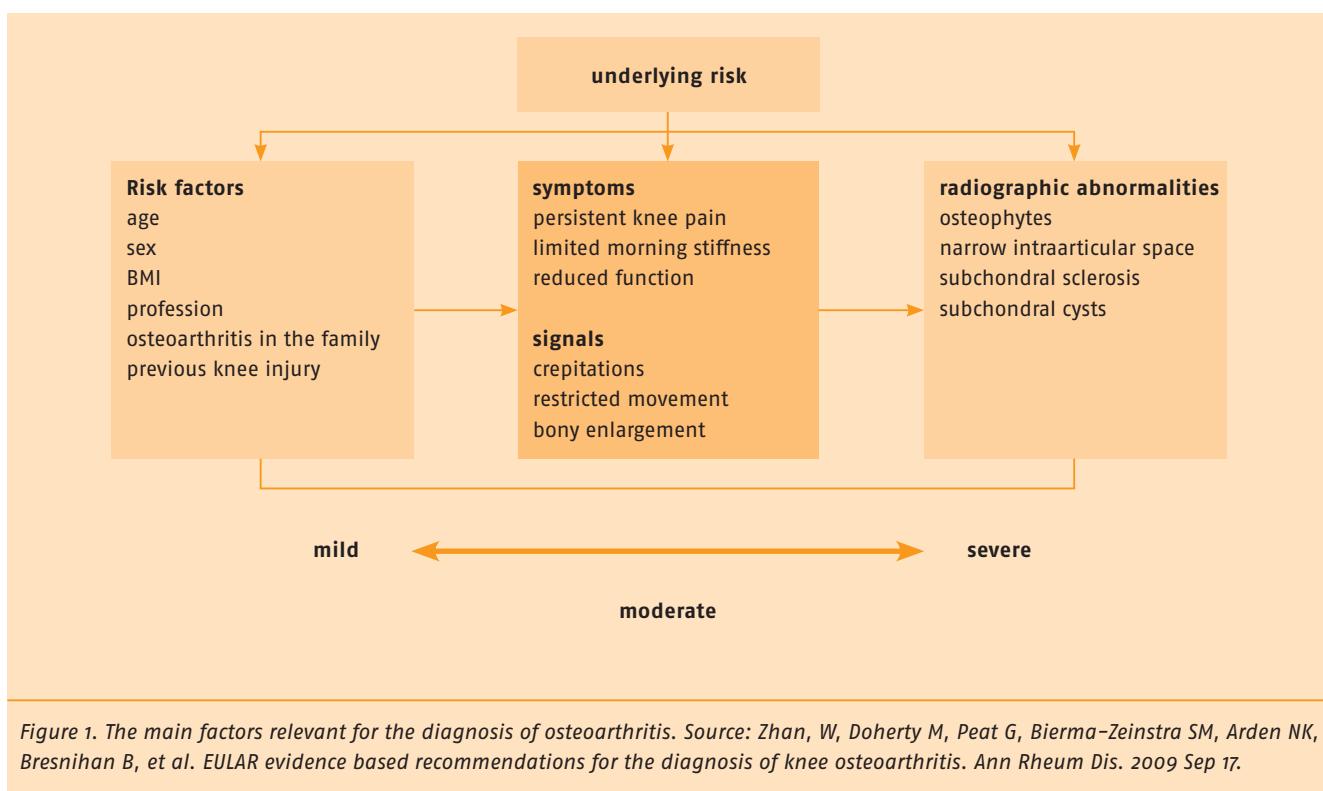
Characteristic features of osteoarthritis of the hip and/or knee include pain, stiffness and eventually a decline in everyday

functioning, which in many cases is influenced by lack of physical activity. In addition, patients may suffer from reduced joint mobility, reduced muscle strength, joint instability, and crepitations. There are often radiographic abnormalities, but these do not correlate closely to complaints like pain, stiffness, and lack of joint mobility. Sometimes there may be obvious osteoarthritis-related radiographic abnormalities even though the patient experiences no pain or impaired movements. The risk of clinical symptoms does, however, increase with the level of radiographic abnormalities.

There are as yet no diagnostic criteria for osteoarthritis of the hip, although the European League Against Rheumatism (EULAR) has recently established diagnostic criteria for osteoarthritis of the knee. Figure 1 summarizes the main factors relevant for the diagnosis of osteoarthritis of the knee.

The clinical diagnosis is established by a physician on the basis of history-taking and physical examination, sometimes supplemented by laboratory tests and/or conventional radiographic (X-ray) examination. Such additional examinations are not strictly necessary if a patient has the classic history and physical examination findings.

Laboratory tests of patients with osteoarthritis show normal values for erythrocyte sedimentation rate, unlike what is seen in rheumatoid arthritis. Radiographic examinations are often done at the patient's request, to confirm the diagnosis. Several grading systems for X-ray findings have been proposed, the most commonly used being that by Kellgren and Lawrence, based on the degree of cartilage loss, the presence of osteophytes, the degree of sclerosis of the subchondral bone, and the formation of cysts. The system distinguishes 5 grades (0-4), and grade 2 or higher indicates the presence of osteoarthritis. In these cases, a



preliminary stage of osteoarthritis may have gone unnoticed for years.

Ultrasound examinations can play a role in differential diagnostics in some exceptional cases. Magnetic resonance imaging (MRI) is not normally indicated for osteoarthritis diagnosis, and is an expensive method. There is, however, a great deal of interest in MRI for research purposes, as MRI evidence of bone marrow edema may predict increases in radiographic abnormalities.

Secondary care physicians may consider additional radiographic examinations to confirm the diagnosis, to optimize therapy, in cases where there is a discrepancy between physical examination findings and the patient's complaints, if a patient fails to respond sufficiently to therapy, or for research purposes.

Routine practice usually uses the clinical diagnosis of osteoarthritis of the hip and/or knee. In view of the lack of correlation between the severity of complaints and functional limitations on the one hand and radiographic abnormalities on the other, there is no point in using additional radiographic examination in primary care to establish the diagnosis of osteoarthritis, although such additional radiographic examination can help optimize the clinical approach.

#### A.3.3 General clinical characteristics

For most patients, the most important symptom of osteoarthritis of the hip and/or knee is pain. In the early stages, this pain occurs when the patient starts to move or after prolonged weight-bearing; the pain commonly increases as the day progresses. In later stages, the pain is also felt at rest and during the night. Stiffness associated with osteoarthritis is usually associated with starting a movement, and tends to disappear after a few minutes. Palpation may reveal bony enlargements (osteophytes) at the margins of the joint, which are tender. In addition to these osteophytes, there may be soft tissue swelling or intra-articular swelling (hydrops or synovitis). A characteristic feature of osteoarthritis are crepitations, which can be heard as well as felt, and are probably caused by the rough intra-articular surfaces and the bony enlargements rubbing against the ligaments.

Pain in osteoarthritis of the hip is usually located in the groin and on the anterolateral side of the hip, or sometimes in the upper leg or radiating to the upper leg and knee. Apart from age (60 years), a number of clinical factors predict the presence and severity of

radiographic signs of osteoarthritis and the severity of complaints. These factors are: pain persisting for more than three months, pain not increasing when the patient sits down, tenderness upon palpation across the inguinal ligament, limited exorotation, endorotation, and adduction, a bony sensation at the extremes of passive movement and loss of muscle strength in hip adduction. Pain in osteoarthritis of the knee is usually located in and around the knee, though it may also be located in the upper leg or hip. A number of clinical factors predict the presence and severity of radiographic signs of osteoarthritis: age over 50 years, morning stiffness lasting less than 30 minutes, crepitations upon movement assessment, tenderness of bony structures, bony enlargement of the knee joint and no raised temperature in the knee joint. Occasionally, the synovium of the hip or knee joint may become inflamed, which may result in pain, swelling and raised temperature. Another characteristic of osteoarthritis is restricted joint mobility, while increasing deterioration of articular structures may cause position deformities, such as genu varum or genu valgum. These changes can lead to instability. The stability of a joint can be defined as 'the capacity to maintain a particular position of the joint or to control movements affected by external strain.' The stability of a joint is ensured by the passive supportive apparatus (ligaments, capsule) and the active neuromuscular system (muscle strength, proprioception). Ensuring the stability of a joint must be regarded as a process affected by a number of factors (including muscle strength, proprioception and laxity). The pain, stiffness, reduced joint mobility, deformities and/or stability problems in both knee and hip osteoarthritis may lead to problems with activities of daily living like walking, stair-walking, sitting down and getting up and putting on socks and shoes. Stability problems can cause a sense of insecurity during activities. Eventually, the abnormalities and limitations in activities of daily living can lead to restricted participation in society, in terms of e.g. work, recreation or sports.

#### A.3.4 Risk factors for development and progression

Osteoarthritis is usually a multifactorial disorder, and it is not yet clear what factors are involved in what patients. Factors influencing the development of osteoarthritis of the hip and/or knee are subdivided into systemic and biomechanical factors (Table 1a).

*Table 1a. Risk factors for the development of osteoarthritis of the hip and/or knee.*

Systemic factors	Biomechanical factors
<ul style="list-style-type: none"> <li>• age</li> <li>• ethnicity*</li> <li>• genetic predisposition*</li> <li>• sex</li> <li>• overweight**</li> <li>• generalized osteoarthritis</li> <li>• malalignment (knee)</li> </ul>	<p><i>Intrinsic factors</i></p> <ul style="list-style-type: none"> <li>• previous trauma</li> <li>• joint disorders (e.g. septic arthritis, reactive arthritis or crystalline arthritis)</li> <li>• congenital factors (e.g. congenital hip dysplasia, Perthes disease and femoral epiphysiolysis)</li> <li>• surgery (e.g. meniscectomy)</li> <li>• muscular weakness**</li> <li>• laxity**</li> </ul> <p><i>Extrinsic factors</i></p> <ul style="list-style-type: none"> <li>• overweight**</li> <li>• strenuous profession (much lifting, squatting and kneeling)</li> <li>• sports (esp. top level sports like soccer or ballet)</li> <li>• prolonged squatting**</li> </ul>

\* less relevant in osteoarthritis of the knee.

\*\* less relevant in osteoarthritis of the hip.

Systemic factors determine the individual vulnerability of a joint to the effect of local biomechanical factors, resulting in osteoarthritis in a particular joint with a particular severity. One potential factor is ethnicity, and the risk of developing osteoarthritis increases with age. Certain genetic factors have also been found to play a role in the development of osteoarthritis of the hip and/or knee, and osteoarthritis is more common among women than among men. Local biomechanical factors can be subdivided into intrinsic local factors, which affect the load-bearing capacity of the joint, and extrinsic local factors, which influence the actual load borne by the joint.

Not all risk factors are equally important in determining for different localizations of osteoarthritis: ethnicity and genetic predisposition appear to be more important in the development of osteoarthritis of the hip, while overweight and prolonged squatting increase the risk of osteoarthritis of the knee. In addition to these risk factors for development of osteoarthritis, there are also risk factors for its progression (Table 1b). These factors may be linked to radiographic progression or progression of clinical symptoms, and once again, not all factors are equally important for osteoarthritis of the hip and of the knee. Overweight is more important as a risk factor for progression of osteoarthritis of the knee than of the hip, whereas higher age, female sex and radiographic abnormalities at the time of diagnosis are major risk factors particularly for progression of osteoarthritis of the hip.

### A.3.5 Course of the disease

The natural course of the disease is highly heterogeneous. Generally speaking, osteoarthritis is a slowly progressive process, in which periods of relative stability, without severe symptoms, alternate with more active periods, in terms of more pain and/or signs of inflammation. There may also be 'flares', a sudden increase in disease activity, with inflammatory symptoms. The rate at which osteoarthritis progresses depends partly on the risk factors present.

Patients with very severe radiographic abnormalities and pain may eventually need to have their knee or hip operated upon. Between 2001 and 2004, an average of 35,373 patients a year had to be

hospitalized in the Netherlands for osteoarthritis, mostly for joint arthroplasty. The average number of operations for osteoarthritis of the hip and/or knee is expected to rise further in years to come.

### A.3.6 Health problems

The health problems faced by people suffering from osteoarthritis of the hip and/or knee are part of a wider spectrum of health problems in this group of patients, which can be described using the 'ICF Core Sets for osteoarthritis' (Table 2).

### A.4 The role of the physical therapist

Physical therapists can play a role in various stages of the disorder. They can guide patients through the process of alleviating and/or learning to cope with their complaints and activity restrictions by means of adaptive and/or compensatory treatment strategies. Physical therapy cannot influence the radiographic progression of osteoarthritis, but can modify the consequences of the disorder, such as limitations of activities and restricted participation or reduced exercise tolerance or muscle strength. These are the areas where physical therapists can greatly affect the course of the osteoarthritis of the hip and/or knee. This type of care is an example of tertiary prevention, that is, preventing further progression or complications of a disorder and improving the patient's self-efficacy. Physical therapists can also become involved during the period prior to and following surgery for osteoarthritis of the hip and/or knee, to ensure that a patient is well prepared for the operation and can function in their home situation again as soon as possible after the procedure. (See also Section C.2.7.) Treatment methods that a physical therapist can use for patients with osteoarthritis of the hip or knee include giving information and advice, individually or in group sessions; supervised exercise, whether individually or in groups, whether land-based or aquatic; physical modalities; and manual therapy. The physical therapy treatment options are described in detail in Section C of this *Guideline*.

*Table 1b. Risk factors for radiographic and clinical progression of osteoarthritis of the hip and/or knee.*

Radiographic progression	Clinical progression
<ul style="list-style-type: none"> <li>• overweight</li> <li>• generalized osteoarthritis</li> <li>• radiographic abnormalities (degree of joint destruction) at first diagnosis*</li> <li>• atrophy of the bone*</li> <li>• elevated CRP</li> <li>• elevated hyaluronic acid level in joint</li> <li>• malalignment (of the knee)</li> <li>• genetic predisposition</li> </ul>	<ul style="list-style-type: none"> <li>• psychosocial factors</li> <li>• depression</li> <li>• low self-efficacy</li> <li>• low socioeconomic status</li> <li>• lack of exercise</li> <li>• advanced age*</li> <li>• female sex*</li> <li>• comorbidity (heart and lung disorders, type 2 diabetes mellitus, poor visual acuity, other articular disorders)</li> <li>• pain</li> <li>• muscular weakness</li> <li>• reduced proprioception</li> <li>• increased laxity of joint</li> </ul>

\* not relevant for osteoarthritis of the knee. CRP = C-reactive protein.

**A.5 General treatment**

No treatment is as yet known to cure osteoarthritis, and the main treatment components are currently, lifestyle advice (including exercise, joint protection measures, and losing weight), pharmacological pain control, exercise therapy and, if these options do not provide sufficient relief, surgery.

Treatment in routine practice often involves several interventions simultaneously, such as a combination of exercise therapy, advice and the use of painkillers.

A more detailed description of the various interventions, including medication and surgery, is provided in the *Review of the Evidence document*.

*Table 2. ICF Core Set for osteoarthritis, adapted for osteoarthritis of the hip and/or knee*

<b>Body functions</b> <ul style="list-style-type: none"> <li>• Energy and drive (b130)</li> <li>• Sleep (b134)</li> <li>• Emotional (b152)</li> <li>• Proprioception (b260)*</li> <li>• Sensation of pain (b280)</li> <li>• Mobility of joint (b710)</li> <li>• Stability of joint (b715)</li> <li>• Mobility of bone (b720)</li> <li>• Muscle power (b730)</li> <li>• Muscle tone (b735)</li> <li>• Muscle endurance (b740)</li> <li>• Control of voluntary movement (b760)</li> <li>• Gait pattern (b770)</li> <li>• Sensations related to muscles and movement (b780)</li> </ul>	<b>Environmental factors</b> <ul style="list-style-type: none"> <li>• Products or substances for personal consumption (e110)</li> <li>• Products and technology for personal use in daily living (e115)</li> <li>• Products and technology for personal indoor and outdoor mobility and transportation (e120)</li> <li>• Products and technology for employment (e135)</li> <li>• Products and technology for culture, recreation, and sport (e140)*</li> <li>• Design, construction, and building products and technology of buildings for public use (e150)</li> <li>• Design, construction, and building products and technology of buildings for private use (e155)</li> <li>• Climate (e225)</li> <li>• Immediate family (e310)</li> <li>• Friends (e320)</li> <li>• Personal care providers and personal assistants (e340)</li> <li>• Health professionals (e355)</li> <li>• Individual attitudes of immediate family members (e410)</li> <li>• Individual attitudes of health professionals (e450)</li> <li>• Societal attitudes (e460)</li> <li>• Transportation services, systems, and policies (e540)</li> <li>• General social support services, systems, and policies (e575)</li> <li>• Health services, systems, and policies (e580)</li> </ul>
<b>Body structures</b> <ul style="list-style-type: none"> <li>• Structure of pelvic region (s740)</li> <li>• Structure of lower extremity (s750)</li> <li>• Additional musculoskeletal structures related to movement (s770)</li> <li>• Structures related to movement, unspecified (s799)</li> </ul>	
<b>Activities</b> <ul style="list-style-type: none"> <li>• Changing basic body position (d410)</li> <li>• Maintaining a body position (d415)</li> <li>• Transferring oneself (d420)*</li> <li>• Walking (d450)</li> <li>• Moving around (d455)</li> <li>• Using transportation (d470)</li> <li>• Moving around using equipment (d465)*</li> <li>• Driving (d475)</li> <li>• Washing oneself (d510)</li> <li>• Toileting (d530)</li> <li>• Dressing (d540)</li> <li>• Acquisition of goods and services (d620)</li> <li>• Doing housework (d640)</li> <li>• Assisting others (d660)</li> <li>• Intimate relationships (d770)</li> </ul>	<b>Personal factors*</b> <ul style="list-style-type: none"> <li>• Age</li> <li>• Sex</li> <li>• Ethnicity</li> <li>• Social background</li> <li>• Education</li> <li>• Profession</li> <li>• Past and present experiences</li> <li>• Comorbidity</li> <li>• Personality traits</li> <li>• Skills</li> <li>• Lifestyle</li> <li>• Habits</li> <li>• Upbringing</li> <li>• Coping</li> <li>• Self-efficacy</li> <li>• Disease perception</li> </ul>
<b>Participation</b> <ul style="list-style-type: none"> <li>• Remunerative employment (d850)</li> <li>• Non-remunerative employment (d855)*</li> <li>• Community life (d910)</li> <li>• Recreation and leisure (d920)</li> </ul>	

\* added by guideline development team 1

## B Diagnostic process

The goal of the diagnostic process is to assess the severity and nature of the health problem and its modifiability by physical therapy. The point of departure is the care requirement as expressed by the individual patient. The physical therapist should reformulate this requirement, and the associated health problems, in terms of the ICF categories.

The overview of clinically most relevant health problems of people with osteoarthritis of the hip and/or knee is based on the so-called 'comprehensive' and 'brief' ICF Core Sets for Osteoarthritis (Figure 2).

### B.1 Presentation and referral

If a Dutch patient has been referred to a physical therapist, the letter of referral should include the following information:

- name of patient (and possibly their address and health insurance details);
- burgerservicenummer (Dutch national identification number);
- date of referral;
- diagnosis (possibly a diagnostic code);
- referral indication;
- patient's care requirement;
- relevant information about patient's health condition (including radiographic abnormalities of the joints, comorbidity, medication use and possibly prognosis);
- name of referring doctor;
- signature of referring doctor;
- name of patient's family doctor (if the patient was referred by someone else).

### B.2 Direct Access to Physical Therapy

If a patient presents to a Dutch physical therapist without being referred ('direct access'), they will first have to go through a screening process to check whether there is an indication for physical therapy. The physical therapist will have to assess the patient's pattern of complaints and symptoms and the possible presence of so-called yellow and red flags. Yellow flags are indications of psychosocial and behavioral risk factors for the persistence and/or deterioration of the patient's health problems. Red flags are patterns of signs or symptoms (alarm signals) that may indicate serious pathology, necessitating further medical diagnostic workup. It is important to be able to recognize the

#### Red flags\*

- unexplained raised temperature, swelling and redness of the knee joint (bacterial infection?)
- unexplained (severe) pain in hip and/or knee joint
- swelling in the groin (malignancy?)
- severe blocking of the knee joint
- (severe) pain at rest and swelling, without trauma (malignancy?)

if patient has one or more prosthetic joints:

- fever
- infection
- unexplained severe pain in hip and/or knee

\* These red flags are specifically relevant for osteoarthritis of the hip and/or knee. There are also yellow, blue and black flags (Section B.3).

typical pattern of complaints of osteoarthritis of the hip and/or knee, in order to decide whether there are specific red flags that do not fit in with this pattern.

If the physical therapist notices one or more of these red flags, he or she must inform the patient about this, as well as their family doctor (with the patient's consent). The patient must also be advised to contact their family doctor or the specialist who is treating them.

There may be local arrangements in force for the communication between physical therapists and family physicians if a therapist notices a red flag.

### B.3 Initial assessment

If the patient has been referred to physical therapy by their family doctor or a specialist, the physical therapist must perform a comprehensive initial assessment to assess whether physical therapy is indicated.

If the patient presents without referral, and physical therapy is indicated, the information obtained through history-taking must be supplemented by means of the initial assessment described below, during which the physical therapist asks the necessary questions to identify the health problems (which will eventually result in a definition of the patient's care requirement). This initial assessment includes the use of specific measurement instruments (see Section B.7), for instance a questionnaire on limitations in activities of daily living.

Since the main complaint for people with osteoarthritis of the hip and/or knee is usually pain, the initial assessment will first concentrate on impairments of body functions and body structure, which include pain, after which the focus will shift to limitations of activities and restrictions of participation, and finally to the influence of environmental and personal factors (Figure 1). Such environmental and personal factors may have favorable or unfavorable effects (i.e. be facilitators or barriers) and may necessitate consultations with the patient's family physician or the referring doctor. It may be necessary to instigate treatment by other care providers, such as a dietician, an occupational therapist, a psychologist or a medical specialist, whether prior to a physical therapy program (to create the right conditions for physical therapy) or simultaneously with such a program.

Recent research has yielded new insights into the role of comorbidity in the functional limitations experienced by people with osteoarthritis of the hip and/or knee, and in the problems these people encounter. Comorbidity may include other joint disorders, cardiovascular diseases, type II diabetes, hypertension, orientational disorders such

#### Examples of environmental and personal barriers:

- comorbidity;
- inadequate coping with complaints.

#### Examples of environmental and personal facilitators:

- high degree of self-efficacy;
- active coping.\*

\* i.e. the patient actively looks for solutions to reduce their complaints and continue to engage in various activities (by e.g. buying a bicycle with an electric motor to allow them to keep moving about) and/or tries to find out their own tolerance level.

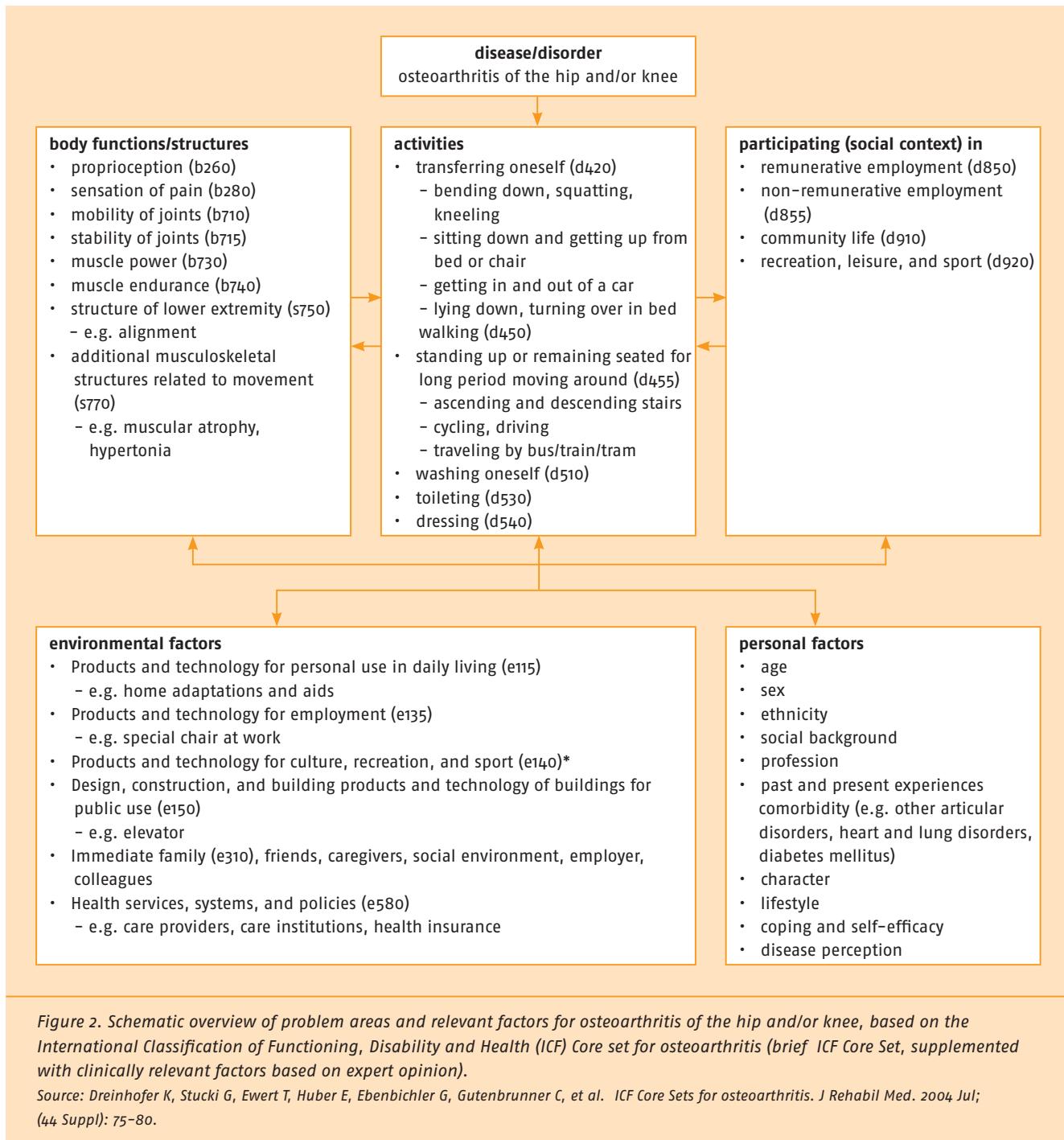


Figure 2. Schematic overview of problem areas and relevant factors for osteoarthritis of the hip and/or knee, based on the International Classification of Functioning, Disability and Health (ICF) Core set for osteoarthritis (brief ICF Core Set, supplemented with clinically relevant factors based on expert opinion).

Source: Dreinhöfer K, Stucki G, Ewert T, Huber E, Ebenbichler G, Gutenbrunner C, et al. ICF Core Sets for osteoarthritis. J Rehabil Med. 2004 Jul; (44 Suppl): 75-80.

as low vision or poor hearing, chronic urinary tract infections, chronic low back pain, depression, chronic non-specific pain or obesity. The physical therapist must estimate the patient's prognosis, motivation and disease perception, and must assess whether the patient can be treated in accordance with the guidelines.

During the initial assessment, the physical therapist must watch out for any red, yellow, blue, or black flags. The red flags were described above in Section B.1.2. Yellow flags are indications of psychosocial risk factors, while blue flags indicate social and economic risk factors and black flags indicate work-related risk factors.

If necessary, the physical therapist can suggest – with the patient's consent – that the referring doctor refer the patient to the relevant specialist care.

#### B.4 Examination

The physical examination is intended to evaluate the patient's functional performance in terms of movements.

##### B.4.1 Inspection

The physical therapist evaluates the position of the joints at rest and how the patient moves, by asking the patient to carry out

some activities of daily living, like sitting down and getting up again, rising from supine, walking and going up and down stairs. The therapist also inspects the patient's back, pelvis, ankles and feet, as well as the quality of their movements and whether the patient uses any aids. If the patient uses a walking aid, the therapist should give extra attention to upper extremity function.

#### B.4.2 Palpation

The physical therapist uses palpation and functional tests to identify any abnormalities in terms of body functions and body structures. Palpation is used to assess the presence of swelling, thickening, raised temperature and muscle tone.

#### B.4.3 Functional testing

Functional testing is used to assess muscle strength, mobility, balance, and coordination, but also stability, as this plays an important role in the patient's functional performance. Coordination and stability can be assessed by means of functional tests like standing on one leg or walking on a variety of surfaces. Passive stability can be assessed using existing manual tests for laxity, like passive angular abduction from a 20 degree flexion of the knee, passive angular adduction from extension and the drawer tests for the knee. Stability involves not only strength and passive stability, but also proprioception. Proprioception tests distinguish between two tactile sensations on the part of the patient, viz. 'joint position sense' (sensing the position of the joint after it has been placed in a particular position by the physical therapist) and 'joint motion sense' (sensing the joint being moved by the therapist).

All findings of the physical examination are then linked to any previously observed activity limitations and participation restrictions (Figure 2).

A number of measurement instruments can be used to determine muscle strength and mobility in patients with osteoarthritis of the hip and/or knee. These instruments are listed in Supplement 2 of this *Guideline*, and are available at [www.fysionet.nl](http://www.fysionet.nl).

#### B.5 Analysis

In the analysis process, the physical therapist uses the information collected during the 'presentation/referral', 'initial assessment' and 'Examination' phases to define the patient's care requirement and health problem(s) in terms of impairments of body functions and body structures, limitations of activities and restrictions of participation, and environmental and personal factors. The therapist identifies the key health problem(s) and assesses to what extent these are modifiable by physical therapy. This assessment is then used to decide whether physical therapy is indicated. The therapist also determines whether there are indications for involving other care providers. If there are, the therapist needs to consult the patient's family doctor or the referring doctor (if the patient was referred by someone else than their family doctor). After having answered the questions relating to the analysis process, the physical therapist formulates the treatment plan, in consultation with the patient. All further steps of the treatment process must be taken in consultation with the patient. If physical therapy is not indicated, the patient is referred back to their family doctor or other care provider (with the patient's consent), whether or not with a recommendation for further referral to another care provider.

#### B.6 Treatment plan

The treatment plan includes the prioritized physical therapy goals. Therapist and patient have to agree (at least orally) on the treatment plan.

The overall objective of treatment, which is central to the treatment plan, should tie in with the patient's expressed care requirement. In defining the main and subsidiary goals, the physical therapist must take account of the patient's level of motivation, the presence of facilitators and barriers and the expected recovery process, based on the outcomes of the measurement instruments. The overall objective and the therapeutic goals should be defined according to the SMART principles. SMART stands for 'specific', 'measurable', 'acceptable', 'realistic' and 'timely', and a SMART therapeutic goal informs the treatment by indicating what the patient hopes to achieve, and guides both patient and therapist. The goals are specified at the level of activities, and indicate what results should be achieved within what period of time. Depending on the degree of individual attention required to treat the patient's health problem, therapist and patient decide whether individual or group treatment is indicated.

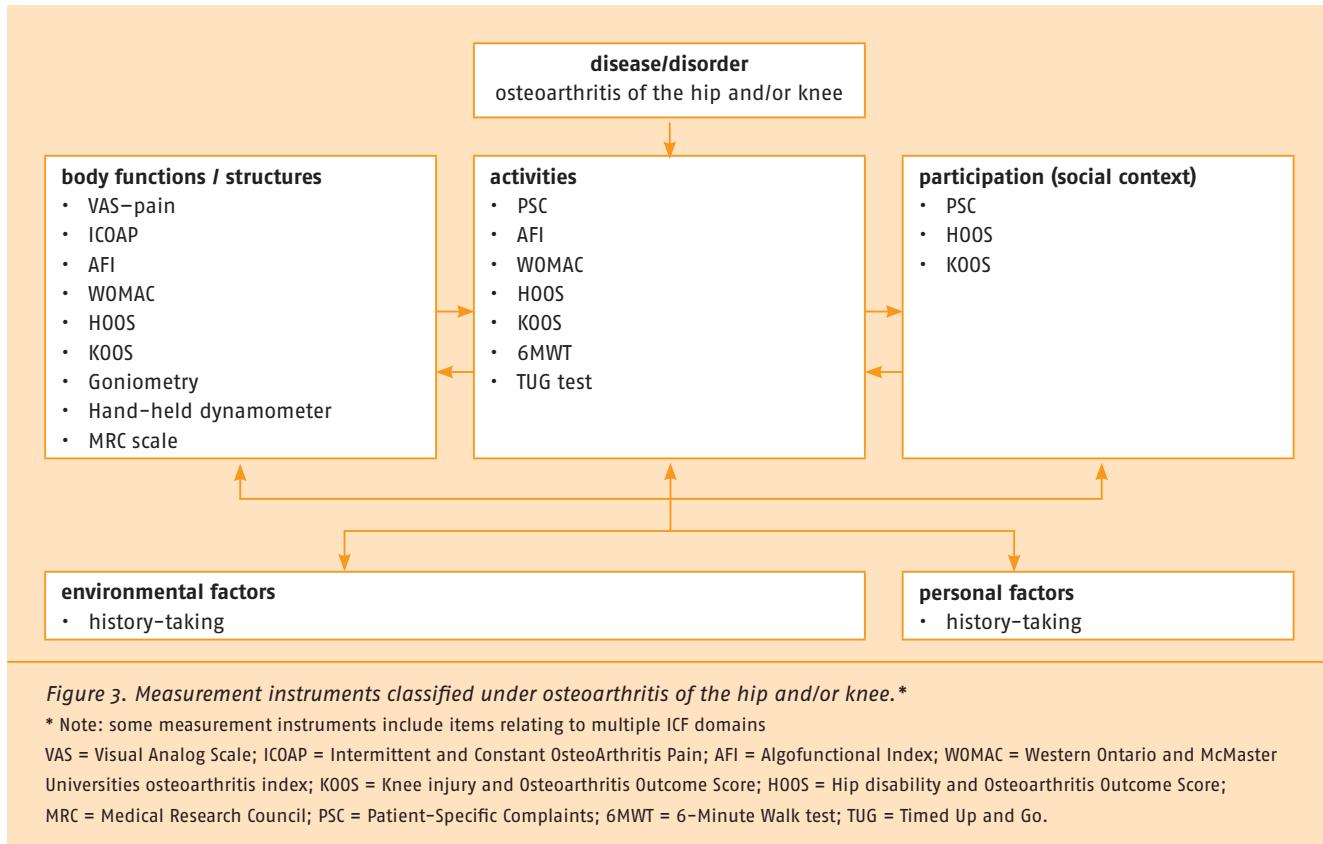
#### B.7 Measurement instruments

Measurement instruments are used to quantify the patient's health problem or assess their tolerance level. A number of such instruments are available to assess health problems associated with osteoarthritis of the hip and/or knee and to evaluate the treatment. Preferably, a combination of one or more questionnaires and one or more performance tests should be used. The preferred combination is that of the patient-specific complaints (PSC) questionnaire and the Timed Up and Go (TUG) test.

Figure 3 provides an overview of the various measurement instruments, linked to the various ICF health domains.

##### Important

- When using measurement instruments, therapists should keep in mind the burden this implies for the patient. A careful choice of instrument is therefore crucially important.
- Some questionnaires assume that only one joint is affected. If several joints are affected, the physical therapist should, in view of the above, and if possible, select an instrument that is suitable for the assessment of problems in more than one joint.

**Figure 3. Measurement instruments classified under osteoarthritis of the hip and/or knee.\***

\* Note: some measurement instruments include items relating to multiple ICF domains

VAS = Visual Analog Scale; ICOAP = Intermittent and Constant OsteoArthritis Pain; AFI = Algodigital Index; WOMAC = Western Ontario and McMaster Universities osteoarthritis index; KOOS = Knee injury and Osteoarthritis Outcome Score; HOOS = Hip disability and Osteoarthritis Outcome Score; MRC = Medical Research Council; PSC = Patient-Specific Complaints; 6MWT = 6-Minute Walk test; TUG = Timed Up and Go.

Four of the questionnaires have a certain overlap in terms of questions on pain, stiffness, and physical performance.

- The Western Ontario and McMaster Universities osteoarthritis index (WOMAC) is a questionnaire that has recently been extensively used in many countries, both in practice and in scientific research; the instrument focuses on certain activity limitations relating to osteoarthritis of the hip as well as the knee.
- The Hip disability and Osteoarthritis Outcome Score (HOOS) and the Knee injury and Osteoarthritis Outcome Score (KOOS) are questionnaires that largely overlap with each other and with the WOMAC, but refer specifically to the hip and the knee, respectively. HOOS and KOOS include questions on the patient's performance in leisure and sports activities, as well as questions on their quality of life. The WOMAC value can be calculated from both HOOS and KOOS.
- The Algodigital Index (AFI) is a questionnaire which was included in the first version of this Guideline; the AFI concentrates on pain during walking and on the patient's maximum walking distance.

## C Therapeutic process

### C.1 General treatment characteristics

#### C.1.1 Location of treatment

Physical therapy treatment can take place at the patient's own home, or in a primary care practice, a rheumatology clinic or rehabilitation center, or in a nursing home or hospital where the patient resides.

The therapist must check the accessibility of the treatment location or room and the presence of certain practical facilities (such as a high-seat chair in the waiting room or a long shoe-horn).

#### C.1.2 Frequency and duration of treatment

Frequency and duration of the treatment of these patients vary, depending on their perceived activity limitations and participation restrictions and the level of impairment of body functions and structures. Based on the (SMART) therapeutic goals that have been established, the physical therapist, in consultation with the patient, should determine the expected number of sessions, the frequency of treatment, the location where the treatment is to take place, and the amount of supervision the therapist will need to provide. The actual number of sessions required to achieve the therapeutic goals depends on the patient's level of motivation, the presence of facilitators or barriers and the patient's coping style. Treatment should be concluded as soon as the therapeutic goals have been achieved, as there is no evidence for benefits of permanent treatment of patients with osteoarthritis of the hip and/or knee. The therapist should, however, explain to the patient how they can maintain the goals achieved or even progress beyond them.

## C.2 Therapeutic methods

### C.2.1 Supervised exercise

#### C.2.1.1 Exercise therapy

Exercises have been proved to be effective in alleviating pain and improving the patient's physical performance in the short term, and should be done under supervision.

The nature and intensity of the exercise program should be tailored to each patient's individual goals as regards limitations of activity and restrictions of participation. In the Guideline Development Committee's opinion, the following forms of exercise are suitable: muscle strengthening exercises, exercises to increase aerobic performance and walking exercises, supplemented by functional exercise, even though the effectiveness of each of these specific exercise forms or an optimized combination of them has not yet been sufficiently ascertained by scientific research.

In the Guideline Development Committee's view, balance and proprioception exercises may be considered in specific cases, if the patient suffers from active instability of the knee, while a behavioral graded activity program can be considered if the patient has a low level of physical performance.

The Committee considers lifestyle changes, such as increasing and maintaining a higher level of physical activity, to be a gradual process. If lifestyle change is one of the treatment goals, it is better to spread the treatment sessions over a longer period of time.

This may involve follow-up sessions at the therapist's practice or telephone calls.

At the end of the treatment period, the therapist should stimulate the patient to engage in regular community exercise or sports activities.

#### C.2.1.2 Hydrotherapy

In view of the huge variety of hydrotherapy interventions that have been investigated, it is difficult to draw conclusions as to the effectiveness of hydrotherapy in general for osteoarthritis of the hip and/or knee. No studies have been found which compared the effectiveness of exercise programs in water with similar land-based programs.

There is an international guideline which does recommend hydrotherapy. Although evidence for its effectiveness is contradictory, hydrotherapy may be a suitable alternative in individual cases, if the patient is in severe pain, if land-based exercising is impossible, or if other treatment options (pharmacological or surgical) are lacking. Patients who are in severe pain can start with hydrotherapy as a preparation for land-based exercising.

### C.2.2 Information and advice

#### C.2.2.1 Educational and self-management interventions

Although educational and self-management interventions as a monotherapy may be effective in improving the patient's psychological health status, research findings about their effect on pain and physical performance have been contradictory. Physical therapy practice often makes successful use of a combination of education, self-management interventions and exercise therapy. The Dutch Institute for Health Care Improvement (CBO) guideline indicates that psycho-educational interventions, if combined with exercise therapy and medication, may be considered for pain relief. Based on research findings and practical experience, the

Guideline Development Committee recommends a combination of educational and self-management interventions and exercise therapy to alleviate pain and improve the patient's psychological status and physical performance.

The Guideline Development Committee is of the opinion that the educational and self-management interventions should in any case concentrate on:

- the specific disorder of osteoarthritis of the hip and/or knee;
- the consequences of the disorder for the patient's performance in terms of movements, activities and participation;
- the relation between the burden placed on the patient and their tolerance level;
- the patient's coping style;
- an active and healthy lifestyle (in terms of exercise, nutrition, and body weight);
- behavioral change (as regards exercise);
- joint protection methods; and
- the use of aids.

For further details on these items, see the Review of Evidence document and the *KNGF-standaard Beweeginterventie Artrose* [Dutch] (guideline on exercise interventions for osteoarthritis; [www.fysionet.nl](http://www.fysionet.nl)).

#### C.2.3 Manual therapy

##### C.2.3.1 Passive movements of a joint

Dutch physical therapists frequently use various interventions involving passive movements of joints for the treatment of patients with osteoarthritis of the hip and/or knee. Research has produced evidence for the efficacy of this treatment, provided it is combined with active exercise therapy.

In the opinion of the Guideline Development Committee, passive joint mobility interventions can be used as a monotherapy in individual cases, on the basis of the findings of the diagnostic process and the treatment goals. This allows barriers to exercise therapy, such as pain and mobility restrictions in a joint, to be overcome, after which the patient can more effectively engage in active exercise therapy.

##### C.2.3.2 Massage

Although massage used to be frequently applied by physical therapists in the past, modern physical therapy for people with osteoarthritis of the hip and/or knee tends to focus on activating the patients and getting them to exercise, which means that massage has largely lost its place in their treatment. The Guideline Development Committee's opinion in this respect is supported by literature reports, which show there is insufficient evidence for the efficacy of massage.

#### C.2.4 Physical modalities

##### C.2.4.1 Thermotherapy

There is insufficient research evidence for the efficacy of thermotherapy for people with osteoarthritis of the hip and/or knee. The Guideline Development Committee is of the opinion that thermotherapy can be considered in individual cases, as a preparation for exercise, for instance if patients have very stiff joints or have difficulty relaxing. Delivering heat to or around a joint is contraindicated if the osteoarthritis has an inflammatory

component, since the heat could raise the intraarticular temperature. Inflamed joints can sometimes be treated with ice-packs.

#### C.2.4.2 TENS/electrotherapy

On the basis of the current evidence, the Guideline Development Committee neither recommends nor discourages the use of TENS to achieve short-term pain relief in people with osteoarthritis of the knee. In view of the short-term effect of this treatment, the Committee is of the opinion that this intervention can be considered in individual patients with osteoarthritis of the knee who are in severe pain. TENS then serves as a facilitator for exercise. A combination of TENS and exercise therapy can be considered for simultaneous pain relief and improvement of physical performance, but this is not the treatment of first choice. In view of the contradictory research findings and the fact that electrostimulation of the quadriceps muscle is not a common intervention in the treatment of people with osteoarthritis of the knee in the Netherlands, the Guideline Development Committee does not recommend this intervention.

#### C.2.4.3 Ultrasound

Research findings on the use of ultrasound in the treatment of people with osteoarthritis of the hip and/or knee have been contradictory, and the intensity of ultrasound interventions varies considerably, making different studies difficult to compare. Dutch and international guidelines offer no recommendations on the use of ultrasound in osteoarthritis of the hip and/or knee. The Health Council of the Netherlands has advised against the use of ultrasound therapy other than for the treatment of tennis elbow. In view of this, the Guideline Development Committee cannot recommend the use of ultrasound for the treatment of people with osteoarthritis of the hip and/or knee.

#### C.2.4.4 Electromagnetic field therapy

In view of the available research findings, the Guideline Development Committee does not recommend the use of electromagnetic field therapy as a treatment for people with osteoarthritis of the knee. The same conclusion has been drawn in Dutch and international guidelines.

#### C.2.4.5 Low-level laser therapy

Although some studies have reported favorable results of laser therapy, Dutch and international guidelines do not recommend its use for the treatment of people with osteoarthritis of the knee. Nor is laser therapy a common intervention for these patients in the Netherlands. Laser therapy is a passive treatment, which has a short-term effect on pain but has no effect on the patient's physical performance. The Guideline Development Committee therefore does not recommend low level laser therapy as a treatment for people with osteoarthritis of the knee.

#### C.2.5 Balneotherapy (passive hydrotherapy)

Research findings on the use of balneotherapy in the treatment of people with osteoarthritis of the hip and/or knee have been contradictory. Balneotherapy is used in health resorts, often in combination with other interventions like exercise therapy. It seems plausible that the environment in such health

resorts contributes to the general well-being of patients with osteoarthritis of the hip and/or knee. The use of balneotherapy is uncommon in the Netherlands, and neither Dutch nor international guidelines recommend it.

The Guideline Development Committee neither recommends nor discourages the use of balneotherapy.

#### C.2.6 Aids

##### C.2.6.1 Braces and orthoses

In treatment of people with osteoarthritis of the knee the use of knee braces and insoles is optional. The quality of research studies on this topic has been uneven, and studies have concentrated on many different interventions, making it difficult to draw unequivocal conclusions on the efficacy of such aids. According to the Guideline Development Committee, therapists can consider the use of a knee brace for patients with general osteoarthritis of the knee and of laterally wedged insoles for medial compartment osteoarthritis. This opinion is in line with Dutch and international guidelines. The Committee is also of the opinion that a medially wedged insole can be considered for the treatment of lateral compartment osteoarthritis.

##### C.2.6.2 Taping

Research has shown that taping has a minor positive effect in terms of pain relief in patients with patellofemoral osteoarthritis. In the Guideline Development Committee's view, this needs to be combined with functional exercise therapy and education, a view based on evidence from the literature.

#### C.2.7 Pre- and postoperative physical therapy for total hip and/or knee arthroplasty

##### C.2.7.1 Preoperative exercise therapy

There is insufficient evidence for the efficacy of preoperative physical therapy to improve the physical performance of patients who have to undergo total hip or knee arthroplasty, and international guidelines do not recommend preoperative physical therapy. The Dutch Institute for Health Care Improvement (CBO) guideline states that preoperative physical therapy is ineffective. Research has shown that a patient's preoperative functional status is an important predictor of postoperative recovery. Although the literature offers no clear evidence for the effects of preoperative exercise therapy, it nevertheless seems useful to ensure that patients with a poor functional status in particular are better prepared for the operation. This could include patients with comorbidity or patients with several affected joints, who are often unable to take part in preoperative educational sessions or joint care programs, but could probably benefit from more individually tailored physical therapy preparation.

In the Guideline Development Committee's opinion, therapists may therefore consider the use of preoperative physical therapy in preparation for total knee or hip arthroplasty.

##### C.2.7.2 Preoperative education

Research has yielded insufficient evidence for the efficacy of preoperative patient education in terms of alleviating pain, shortening hospital stay, improving postoperative therapy compliance and increasing patient satisfaction, improving range of motion (ROM) and joint mobility or preventing deep vein

thrombosis in people who have had joint replacement surgery. On the other hand, patients are usually given preoperative information about the nature of the surgery and the associated hospital stay. Such preparatory education may be considered to reduce their anxiety about the operation.

#### C.2.7.3 Postoperative exercise therapy

The Guideline Development Committee recommends the use of postoperative exercise therapy to improve patients' physical performance after total hip or knee arthroplasty, although research findings indicate that the efficacy of exercise therapy is greater after knee arthroplasty than after hip arthroplasty. The CBO guideline also recommends postoperative exercise therapy. In the Committee's opinion, strength training and functional exercises are the most effective options.

#### C.2.7.4 Continuous Passive Motion (CPM)

CPM involves the knee joint being passively moved by a device over a certain number of degrees, set by the physical therapist. Research findings on the efficacy of CPM after total knee arthroplasty have been contradictory.

The Guideline Development Committee can therefore neither recommend nor discourage CPM for the aftercare of people who have had total knee arthroplasty, even though CPM is used in many hospitals.

### C.3 Evaluation

#### C.3.1 Aftercare

The physical therapist should advise the patient on maintaining the targets they have achieved, for instance by giving them tips on engaging in healthy physical activity behavior in their everyday life or, if useful, by helping patients enter regular community exercise or sports programs, or supervised group exercise programs, such as tai chi, Nordic walking or other exercise programs offered by local rheumatism patient associations (e.g. the Dutch "Sportief Wandelen" (walking for exercise), "Bewegen is Plezier" (exercise is fun), or "Meer Bewegen voor Oudereren" (more exercise for the elderly) programs).

#### C.3.2 Concluding the treatment and reporting

The therapy should be concluded when the therapeutic goals have been achieved, or when the therapist is of the opinion that further physical therapy no longer offers any added value. Treatment should also be terminated when the therapist estimates that the patient is able to achieve the goals independently (i.e. without their assistance). The therapist should report to the doctor who has referred the patient, at least at the conclusion of treatment, but preferably also during the treatment period, informing them of the individual therapeutic goals set for their patient, the course of the therapeutic process and the results obtained. If the patient was not referred by their family doctor, the latter should also get a copy of the report. Reporting should conform to the KNGF guideline on Reporting on Physical Therapy (December 2007 version). In accordance with this guideline, the final report should preferably not only include the minimally required details, but also indicate:

- whether treatment was in accordance with the KNGF guidelines, any deviations from the guidelines and reasons for doing so; and
- whether follow-up sessions have been planned.

### D Acknowledgements

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The inclusion of the above persons as consultants does not imply that each of them agrees with every detail of the Guideline.

# Supplements

## Supplement 1 Conclusions and recommendations

### Explanation of evidence levels

The levels of evidence for the literature-based conclusions have been defined in Dutch national agreements (EBR0/CBO). These distinguish four levels, depending on the quality of the studies on which they are based:

- Level 1: a study of A1 quality, or at least two independent studies of A2 quality
- Level 2: one study of A2 quality or at least two independent studies of B quality
- Level 3: one study of B or C quality
- Level 4: expert opinion

### Quality categories (for intervention and prevention)

- A1 Systematic review including at least two independent studies of A2 quality
- A2 Randomized double-blind comparative clinical trial of sound quality and sufficient size
- B Comparative studies not meeting all the quality criteria mentioned under A2 (including case-control studies and cohort studies)
- C Non-comparative studies
- D Opinions of experts, e.g. the members of the Guideline Development Committee

*On the basis of the conclusions from scientific research, the Guideline Development Committee has formulated the following recommendations:*

#### Diagnostic process

##### 1 Initial assessment

The physical therapist should identify the health problems of a patient with osteoarthritis of the hip and/or knee by assessing their health status using the health domains of the ICF model: body function and structure, activities, participation, environmental and personal factors (level 4).

Quality level of articles: D.

##### 2 Red flags

The physical therapist should always check whether 'red flags' are present. If there are one or more red flags, the therapist must inform the patient of this and advise them to contact their family physician (if the patient had presented to the physical therapist as a Direct Access patient) or the referring doctor (level 4).

Quality level of articles: D.

##### 3 Barriers and facilitators

The physical therapist should always check which factors influence the health problems of patients with osteoarthritis of the hip and/or knee, and whether these can be favorably modified by physical therapy. The therapist needs to assess what barriers and facilitators may affect the treatment, and to what degree (level 4).

Quality level of articles: D.

##### 4 Measurement instruments 1

The Guideline Development Committee recommends that the physical therapist use a combination of one or more performance tests (preferably the Timed Up and Go test) and one or more questionnaires (preferably the Patient-Specific Complaints list), to assess the patient's health problems as well as to evaluate the treatment (level 4).

Quality level of articles: D.

##### 5 Measurement instruments 2

The Guideline Development Committee recommends choosing the measurement instrument that covers the ICF-related health domain within which the patient defines their problems and/or complaints (level 4).

Quality level of articles: D.

## Therapeutic process

### 6 Exercise therapy for osteoarthritis of the hip and/or knee

- On the basis of the currently available evidence, the Guideline Development Committee recommends the use of exercise therapy to alleviate pain and improve physical performance (level 1).  
Quality level of articles: A1 (Fransen et al., 2008<sup>1</sup>; Hernandez et al., 2008<sup>2</sup>; Jamtvedt et al., 2008<sup>3</sup>; and Moe et al., 2007<sup>4</sup>) and A2 (Doi et al., 2008<sup>5</sup>; Jan et al., 2008<sup>6-7</sup>; and Lim et al., 2008<sup>8</sup>); and B (Aglamis et al., 2008<sup>9</sup>).
- On the basis of the currently available evidence, the Guideline Development Committee recommends supervised exercise therapy (level 2).  
Quality level of articles: A2 (McCarthy et al., 2004<sup>10</sup> and Deyle et al., 2005<sup>11</sup>).
- On the basis of the currently available evidence, the Guideline Development Committee cannot recommend specific types of exercises or intensities (level 3).  
Quality level of articles: B (Mangione et al., 1999<sup>12</sup>).
- The Guideline Development Committee recommends that an exercise program needs to include at least muscle strengthening, exercises to increase aerobic capacity, walking exercises and functional exercises, whether or not in combinations (level 4).  
Quality level of articles: A1 (Fransen et al., 2008<sup>1</sup>) and D.
- The Guideline Development Committee recommends that the content and intensity of the exercise program be tailored to the patient's individual goals in terms of limitations of activity and restrictions of participation (level 4).  
Quality level of articles: A2 (Veenhof et al., 2006, 2007<sup>13-14</sup> and Diracoglu et al., 2005<sup>15</sup>).
- The Guideline Development Committee is of the opinion that balance and proprioception exercises and/or a behavioral graded activity program can be considered in individual cases (level 4).  
Quality level of articles: A2 (Veenhof et al., 2006, 2007<sup>13-14</sup> and Diracoglu et al., 2005<sup>15</sup>).
- The Guideline Development Committee recommends spreading the treatment sessions over longer periods with lower frequencies in the later stages of the exercise program, to facilitate the transition from exercise therapy to independent exercising and maintaining a sufficient level of physical activity (level 4).  
Quality level of articles: A1 (Fransen et al., 2008<sup>1</sup> and Pisters et al., 2007<sup>16</sup>).
- The Guideline Development Committee recommends that after a period of supervised exercise, patients should be referred to regular community exercise and sports activities (level 4).  
Quality level of articles: D.

### 7 Hydrotherapy for osteoarthritis of the hip and/or knee

- On the basis of the currently available evidence, the Guideline Development Committee can neither recommend nor discourage the use of hydrotherapy to reduce pain and stiffness and improve physical performance (level 1).
- The Guideline Development Committee is of the opinion that hydrotherapy can be considered in individual cases, for instance for patients who are in severe pain, who do not benefit from land-based exercise therapy or for whom other treatment options are not available (level 4).  
Quality level of articles: A1 (Bartels et al., 2007<sup>17</sup>) and A2 (Fransen et al., 2007<sup>18</sup>; Hinman et al., 2007<sup>19</sup>; Lund et al., 2008<sup>20</sup>; Silva et al., 2008<sup>21</sup>; and Wang et al., 2006<sup>22</sup>).

### 8 Patient education and promoting effective self-management of osteoarthritis of the hip and/or knee

- On the basis of the currently available evidence and best practice, the Guideline Development Committee recommends a combination of exercise therapy and patient education / self-management interventions to improve the patient's mental and physical performance and alleviate pain (level 2).
- The Guideline Development Committee recommends that an intervention involving patient education and the promotion of effective self-management should at least include the following components: knowledge and understanding of osteoarthritis of the hip and/or knee; its consequences for the patient's functional performance in terms of movements, activities and participation; the relation between burden and tolerance level; the way a patient copes with health problems; what constitutes an active and healthy lifestyle (in terms of exercise and nutrition / overweight); behavioral change (regarding physical activity); joint protection measures and the use of aids (level 4).  
Quality level of articles: A1 (Devos-Comby et al., 2006<sup>23</sup>), A2 (Buszewicz et al., 2006<sup>24</sup>; Heuts et al., 2005<sup>25</sup>; Wetzels et al., 2008<sup>26</sup>; Victor et al., 2005<sup>27</sup>; Maurer et al., 1999<sup>28</sup>; Tak et al., 2005<sup>29</sup> and Hopman-Rock et al., 2000<sup>30</sup>), and B (Mazzuca et al., 1997<sup>31</sup> and Yip et al., 2007, 2008<sup>32-33</sup>).

## **9 Passive joint movement interventions**

### **Osteoarthritis of the hip and/or knee**

- On the basis of the currently available evidence and best practice, the Guideline Development Committee recommends using a combination of active and passive exercise therapy to alleviate pain and improve physical performance in individual cases involving severe pain and/or highly restricted movements (level 2).

Quality level of articles: A2 (Deyle et al., 2000<sup>34</sup>; Fransen et al., 2003<sup>35</sup>; and Van Baar et al., 1999<sup>36</sup>).

### **Osteoarthritis of the hip**

- The Guideline Development Committee is of the opinion that traction mobilization and stretch exercises as a preparation for active exercise can be considered in individual cases involving severe pain and/or highly restricted joint mobility (level 4).

### **Osteoarthritis of the knee**

- The Guideline Development Committee is of the opinion that mobilization interventions in the form of tibiofemoral and patellofemoral translations can be considered as a preparation for active exercise in individual cases involving severe pain and/or highly restricted joint mobility (level 4).

Quality level of articles: A2 (Hoeksma et al., 2004, 2005<sup>37-38</sup>; Vaarbakken et al., 2007<sup>39</sup>; Moss et al., 2007<sup>40</sup>; and Pollard et al., 2008<sup>41</sup>).

## **10 Massage for osteoarthritis of the hip and/or knee**

- On the basis of the currently available evidence and best practice, the Guideline Development Committee cannot recommend massage (level 2).

Quality level of articles: A2 (Perlman et al., 2006<sup>42</sup>).

## **11 Thermotherapy for osteoarthritis of the knee**

- The Guideline Development Committee is of the opinion that heat delivery and icepacks can be considered as a preparation for active exercise in individual cases involving high muscle tone and/or severe pain and inflammatory activity with severe pain, respectively (level 4).

Quality level of articles: A1 (Brosseau et al., 2003<sup>43</sup>) and A2 (Laufer et al., 2005<sup>44</sup>; Evcik et al., 2007<sup>45</sup>; Seto et al., 2008<sup>46</sup>; and Ones et al., 2006<sup>47</sup>).

- The Guideline Development Committee discourages the delivery of heat if the patient's knee is inflamed (level 4).

Quality level of articles: D.

## **12 Transcutaneous electrical nerve stimulation (TENS) / electrotherapy**

### **Osteoarthritis of the knee**

- On the basis of the currently available evidence, the Guideline Development Committee can neither recommend nor discourage the use of TENS to alleviate pain (level 1).

Quality level of articles: A1 (Osiri et al., 2000<sup>48</sup>; Brosseau et al., 2004<sup>49</sup>; and Björdal et al., 2007<sup>50</sup>) and A2 (Ng et al., 2003<sup>51</sup>).

- The Guideline Development Committee is of the opinion that a combination of TENS and exercise therapy can be considered in individual cases involving severe pain (level 4).

Quality level of articles: A2 (Cetin et al., 2008<sup>52</sup>).

- On the basis of the currently available evidence and best practice, the Guideline Development Committee cannot recommend electrostimulation of the quadriceps muscle to alleviate pain, reduce stiffness or improve physical performance (level 2).

Quality level of articles: B (Durmus et al., 2007<sup>53</sup>; Gaines et al., 2004<sup>54</sup>; and Talbot et al., 2003<sup>55</sup>).

### **Osteoarthritis of the hip**

- There is insufficient evidence to recommend TENS for osteoarthritis of the hip (level 3).

Quality level of articles: B (Cottingham et al., 1985<sup>56</sup>).

## **13 Ultrasound for osteoarthritis of the knee**

- On the basis of the currently available evidence and best practice, the Guideline Development Committee cannot recommend the use of ultrasound (level 2).

Quality level of articles: A1 (Welch et al., 2001<sup>57</sup>) and A2 (Kozanoglu et al., 2003<sup>58</sup>; Huang et al., 2005<sup>59</sup>; and Ozgonenel et al., 2009<sup>60</sup>).

## **14 Electromagnetic field therapy for osteoarthritis of the knee**

- On the basis of the currently available evidence, the Guideline Development Committee cannot recommend the use of electromagnetic field therapy (level 1).

Quality level of articles: A1 (Björdal et al., 2007<sup>50</sup>) and A2 (Cantarini et al., 2007<sup>61</sup>; Ay et al., 2008<sup>62</sup> and Rattanachaiyanont et al., 2008<sup>63</sup>).

**15 Low level laser therapy for osteoarthritis of the knee**

- The Guideline Development Committee cannot recommend low level laser therapy, despite the evidence from the literature (level 4).  
Quality level of articles: A1 (Björdal et al., 2007<sup>50</sup>).

**16 Balneotherapy for osteoarthritis of the hip and/or knee**

- On the basis of the currently available evidence, the Guideline Development Committee can neither recommend nor discourage the use of balneotherapy to alleviate pain and improve physical performance (level 1).  
Quality level of articles: A1 (Verhagen et al., 2008<sup>64</sup>) and A2 (Cantarini et al., 2007<sup>61</sup> and Balint et al., 2007<sup>65</sup>).

**17 Braces and orthoses for osteoarthritis of the knee**

- On the basis of the currently available evidence, the Guideline Development Committee concludes that wearing a knee brace to improve stability and to alleviate pain can be considered for patients with osteoarthritis of the knee and an unstable joint (level 3).
- On the basis of the currently available evidence and best practice, the Guideline Development Committee concludes that the use of a laterally wedged insole for medial compartment osteoarthritis or a medially wedged insole for lateral compartment osteoarthritis can be considered (level 3).  
Quality level of articles: A1 (Brouwer et al., 2005<sup>66</sup>) and A2 (Barrios et al., 2009<sup>67</sup>; Rodrigues et al., 2008<sup>68</sup>; and Toda et al., 2008<sup>69</sup>).

**18 Taping for patellofemoral osteoarthritis**

- On the basis of the currently available evidence and best practice, the Guideline Development Committee recommends taping the patella to alleviate the pain, preferably in combination with muscle strengthening and functional exercise therapy and patient education (level 2).  
Quality level of articles: A1 (Warden et al., 2008<sup>70</sup>) and A2 (Quilty et al., 2003<sup>71</sup>).

**Recommendations for pre- and postoperative physical therapy interventions, with level of recommendation****19 Preoperative physical therapy preparing for total hip and/or knee arthroplasty**

- On the basis of the currently available evidence, the Guideline Development Committee cannot recommend preoperative physical therapy (level 3).
- The Guideline Development Committee is of the opinion that preoperative physical therapy to improve the patient's physical performance can be considered in individual cases involving severe preoperative functional limitations (level 4).  
Quality level of articles: A2 (Beaupre et al., 2004<sup>72</sup>) and B (Ackerman et al., 2004<sup>73</sup>; Gilbey et al., 2003<sup>74</sup>; Wang et al., 2002<sup>75</sup>; Gocen et al., 2004<sup>76</sup>; Rooks et al., 2006<sup>77</sup>; Ferrara et al., 2008<sup>78</sup>; Vukomanovic et al., 2008<sup>79</sup>; and Topp et al., 2009<sup>80</sup>).

**20 Preoperative patient education for total hip and/or knee arthroplasty**

- On the basis of the currently available evidence, the Guideline Development Committee cannot recommend preoperative patient education as a means to shorten hospital stay, reduce postoperative pain, improve compliance with postoperative therapy, increase patient satisfaction, ROM or mobility or prevent deep vein thrombosis (level 3).
- The Guideline Development Committee is of the opinion that preoperative patient education by a physical therapist about the operation and the hospital stay can be considered in individual cases where patients are anxious about the operation and the aftercare (level 4).  
Quality level of articles: A1 (Johansson et al., 2005<sup>81</sup>) and B (McDonald et al., 2004<sup>82</sup>).

**21 Postoperative physical therapy after total hip and/or knee arthroplasty**

- On the basis of the currently available evidence and best practice, the Guideline Development Committee recommends the use of postoperative exercise therapy, preferably including strengthening and functional exercises to improve the patient's physical performance (level 2).  
Quality level of articles: A1 (Minns Lowe et al., 2007<sup>83</sup>), A2 (Wang et al., 2002<sup>75</sup> and Beaupre et al., 2004<sup>72</sup>) and B (Minns Lowe et al., 2009<sup>84</sup>; Galea et al., 2008<sup>85</sup>; Gilbey et al., 2003<sup>74</sup>; Ferrara et al., 2008<sup>78</sup>; and Rooks et al., 2008<sup>77</sup>).  
• There is insufficient evidence to recommend postoperative electric muscle stimulation as a means of improving the patient's physical performance (level 3).  
Quality level of articles: B (Avramidis et al., 2003<sup>86</sup> and Gremeaux et al., 2008<sup>87</sup>).

**22 Continuous Passive Motion (CPM) after total knee arthroplasty**

- On the basis of the currently available evidence, the Guideline Development Committee can neither recommend nor discourage CPM (level 1).  
Quality level of articles: A1 (Milne et al., 2003<sup>88</sup>) and A2 (Denis et al., 2006<sup>89</sup>; Lenssen et al., 2008<sup>90</sup>; and Bruun et al., 2009<sup>91</sup>).

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## Supplement 2 Measurement instruments

The following measurement instruments are used for people with osteoarthritis of the hip and/or knee.

All of these instruments or their descriptions are available at <http://www.fysionet.nl>, except for HOOS and KOOS, which are available at <http://www.koos.nl>.

measurement instrument	location
Visual Analog Scale (VAS)	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>
Goniometry	
Patient-Specific Complaints (PSC)	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>
Intermittent and Constant OsteoArthritis Pain (ICOAP) questionnaire	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>
Handheld Dynamometer	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>
6-Minute Walk test	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>
Timed Up and Go test	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>
Hip disability and Osteoarthritis Outcome Score (HOOS), Dutch version	<a href="http://www.koos.nu">http://www.koos.nu</a>
Knee injury and Osteoarthritis Outcome Score (KOOS), Dutch version	<a href="http://www.koos.nu">http://www.koos.nu</a>
Algofunctional Index (AFI)	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>
Western Ontario and McMaster Universities osteoarthritis index (WOMAC), Dutch version	<a href="http://www.fysionet.nl">http://www.fysionet.nl</a>

Medical Research Council (MRC) scale for measuring muscle strength	
grade	symptom
0	no contraction
1	trace of contraction, no movement
2	movement only if resistance of gravity is removed
3	movement against gravity
4	movement against light resistance
5	normal movement against full resistance

## Supplement 3 Materials for professional development

The *KNGF Guideline on Osteoarthritis* of the hip and/or knee describes the physical therapy treatment of patients with hip and/or knee osteoarthritis, based as much as possible on scientific evidence. This assessment form refers to a number of activities and interventions that were selected from the Guideline as they represent important quality criteria for the examination and treatment of patients with health problems related to osteoarthritis of the hip and/or knee. You can systematically check whether you are treating your patients in accordance with the KNGF Guideline by checking off each item. You can also indicate why you deviate from the guidelines in specific cases.

You can use this form in two ways.

**1. Without having read the Guideline first.**

You then use the form as an instrument for self-evaluation or knowledge assessment. If you are already complying with most of the recommendations, this means you are largely working in accordance with the guidelines. You can then study those items in the Guideline document which you do not yet comply with.

**2. After having read the Guideline.**

You then use the instrument as a checklist for your own practice. If you wish, you can supplement the list with items from the Guideline that you consider to be essential for the quality of your work, resulting in a personal checklist to support your work as a therapist. If you use it as such, it might be useful to make a number of copies of the list, so you can use it for each patient with health problems related to osteoarthritis of the hip and/or knee. The form allows you to indicate your arguments for deviating from the guidelines for a specific patient.

### Key points from the Guideline

yes no explanation

#### Diagnostic process

- The diagnostic process should involve asking specific questions to ascertain whether the consequences of osteoarthritis of the hip and/or knee that the patient is having to cope with are within the physical therapist's scope of competence.   .....
- The physical therapist should identify the health problems of a patient with osteoarthritis of the hip and/or knee by assessing their health status using the health domains of the ICF model: body function and structure, activities, participation, environmental and personal factors.   .....
- The physical therapist should always check whether a patient has any 'red flags'. If there are one or more red flags, the therapist must inform the patient of this and advise the patient to contact their family physician (if the patient had presented to the physical therapist as a Direct Access patient) or the referring doctor.   .....
- The physical therapist should always check which factors are influencing the health problems of patients with osteoarthritis of the hip and/or knee, and whether these can be favorably modified by physical therapy. The therapist needs to assess what barriers and facilitators may affect the treatment, and to what degree.   .....
- The Guideline Development Committee recommends that the physical therapist use a combination of one or more performance tests and one or more questionnaires, as specified in this Guideline, to identify the patient's health problems.   .....
- The preferred performance test to measure functional activity is the Timed Up and Go test (TUG test).   .....
- The preferred questionnaire to measure functional activity is the Patient-Specific Complaints (PSC) list.   .....
- The Guideline Development Committee recommends choosing the measurement instrument that covers the health domain within which the patient defines their problems and/or complaints.   .....

	yes	no	explanation
<b>Analysis and treatment plan</b>			
• Based on the patient's expressed care requirements, the therapist, in consultation with the patient, should draw up a treatment plan and implement the treatment.	<input type="radio"/>	<input type="radio"/>	.....
• The treatment plan should take account of any potentially relevant facilitators or barriers.	<input type="radio"/>	<input type="radio"/>	.....
• The treatment plan should preferably include "SMART" therapeutic goals.	<input type="radio"/>	<input type="radio"/>	.....
<b>Therapeutic process</b>			
• The treatment of people with osteoarthritis of the hip and/or knee should focus on activity limitations and participation restrictions, rather than on impairments of body functions and structure.	<input type="radio"/>	<input type="radio"/>	.....
• The physical therapist should preferably offer people with osteoarthritis of the hip and/or knee active treatment (e.g. exercise therapy).	<input type="radio"/>	<input type="radio"/>	.....
• Treatment of people with osteoarthritis of the hip and/or knee should preferably be target-oriented.	<input type="radio"/>	<input type="radio"/>	.....
• At the conclusion of the treatment, the physical therapist should explain to the patient how they can maintain the goals achieved and perhaps even progress beyond them.	<input type="radio"/>	<input type="radio"/>	.....
<b>Evaluation</b>			
• The Guideline Development Committee recommends that the physical therapist use a combination of one or more performance tests and one or more questionnaires, as specified in this Guideline, to evaluate the treatment.	<input type="radio"/>	<input type="radio"/>	.....
• The treatment should be terminated when the therapeutic goals have been achieved or when no further favorable effects of treatment are to be expected.	<input type="radio"/>	<input type="radio"/>	.....
• The therapist should inform the referring doctor about the therapeutic goals, the results of the treatment and the recommendations made to the patient, at least at the end of the treatment, and possibly also during the treatment period.	<input type="radio"/>	<input type="radio"/>	.....
• The therapist should record the treatment data in a report (see also the KNGF Guideline on reporting about physical therapy).	<input type="radio"/>	<input type="radio"/>	.....

## Discussion guide to facilitate discussing the Guideline with colleagues

The *KNGF Guideline on Osteoarthritis of the hip and/or knee* describes the currently preferred physical therapy treatment of patients with health problems related to hip or knee osteoarthritis, based as much as possible on scientific evidence. The purpose of this discussion guide is to facilitate discussions of the Guideline with your peers. The guide can also be used as an individual test of your knowledge.

The discussion guide presents a number of statements about key points in the Guideline, which help you go through the Guideline, individually or in a group discussion.

You can use the guide in various ways:

- You can define your own individual opinions about the statements.
- You can discuss these opinions with a group of colleagues.
- You can check what the Guideline says about these statements and what evidence it presents, and then discuss the consequences for the way you treat patients with osteoarthritis of the hip and/or knee.

### Statements

1. The diagnostic process focuses primarily on limitations of activities and participation, and subsequently on impairments underlying these problems.
2. The treatment plan and its implementation are based on the patient's expressed care requirements and expectations.
3. The most important aspect of the treatment of people with osteoarthritis of the hip and/or knee is treating the impairments of body function and structure.
4. The ultimate goal of treatment is for the patient to achieve the normal, or preferred, level of activity and participation.
5. It is important to take facilitators and barriers into account when defining the therapeutic goals.
6. The role of the physical therapist when treating people with osteoarthritis of the hip and/or knee is that of a coach rather than a hands-on therapist.
7. Effective therapeutic care for people with osteoarthritis of the hip and/or knee is characterized by:
  - effective education and discussion about diagnostics and therapy;
  - focusing on functional exercise;
  - helping patients to effectively cope with their complaints;
  - target-oriented approach;
  - stimulating self-efficacy and an active lifestyle during and after the therapy;
  - efficient use of therapy sessions, in terms of number, duration and frequency.
8. The use of questionnaires offers added value in evaluating therapy outcomes for people with osteoarthritis of the hip and/or knee.
9. The Guideline presents a clear description of the screening and diagnostic process for people with osteoarthritis of the hip and/or knee and offers a systematic structure for its implementation.
10. The Guideline presents a clear description of the therapeutic process for patients with osteoarthritis of the hip and/or knee and offers a systematic structure for its implementation.
11. The recommendations offered in the *KNGF Guideline on Osteoarthritis of the hip and/or knee* fit in with my/our current practice routines.

## Discussion guide to facilitate the collaboration between general practitioners and physical therapists

This discussion guide offers practical suggestions for discussing the subject of osteoarthritis of the hip and/or knee. The goals of the discussion are decided upon by you and your discussion partner(s), and may involve exchanging information, drawing up specific agreements or evaluating what you had agreed previously.

The *KNGF Guideline on Osteoarthritis of the hip and/or knee* describes how physical therapists can help patients who experience health problems related to hip and/or knee osteoarthritis to achieve the best possible functional status. The Guideline explicitly discusses the place of physical therapists in the care process, based on their specific expertise and on research evidence.

There are many similarities between the management of patients with osteoarthritis of the hip and/or knee as used by general practitioners and physical therapists. Both focus on stimulating physical activity and on patient education and advice.

Not all patients with health problems related to osteoarthritis of the hip and/or knee need physical therapy. The patient's recovery process can be optimized if general practitioners and physical therapists exchange information, at national as well as local level, about what each has to offer. In addition, the physical therapists can present supplementary information about their specific expertise and skills. The goal of such discussions is to develop a joint policy, close collaboration and consultations between general practitioners and physical therapists so as to optimize the care of people with osteoarthritis of the hip and/or knee.

### Steps in the process: information exchange – agreements – evaluation

The general practitioner should select a few patients with osteoarthritis of the hip and/or knee to serve as example cases, preferably patients for whom physical therapy is indicated and who are being treated, or have been treated in the past, by the physical therapist taking part in the discussion (or one of them if the discussion includes more than one therapist).

1. The rheumatologist or general practitioner presents a patient's case by way of example and explains why he or she thinks physical therapy is indicated for this patient or not, discussing:
  - the patient's characteristics;
  - their own management and possible alternatives;
  - the timing of referral;
  - why he or she decided to use a particular therapy or to make use of the physical therapist's expertise;
  - expectations regarding the outcome of the therapy.
2. The physical therapist explains his or her approach in this particular case, discussing:
  - the conclusions drawn from the screening and diagnostic process;
  - the patient's activity limitations and participation restrictions;
  - which of the patient's impairments of body function and structure can be modified by physical therapy;
  - the short-term and long-term therapeutic goals;
  - the forms of physical therapy applied;
  - the expected outcome.
3. The discussion should also cover the contents of the KNGF Guideline on Osteoarthritis of the hip and/or knee and the patient's management by the general practitioner.
4. Points for discussion:
  - the importance of stimulating exercise;
  - setting a timetable for the achievement of the various therapeutic goals;
  - the main components of therapy: information/advice, supervised exercise;
  - the disadvantages of therapy focusing primarily on impairments of body function and structure;
  - treatment focusing on activities (functional exercises);
  - limiting the use of passive therapeutic methods, such as physical modalities and massage;
  - the need to stimulate patients to maintain physical activity during and after the therapy period.
5. The general practitioner and the physical therapist(s) should come to agreements about the management of health problems related to osteoarthritis of the hip and/or knee, which they should confirm in writing, including:
  - the criteria used to decide whether physical therapy is indicated (such as the nature of the health problem and patient characteristics);
  - at what point in time physical therapy is indicated;
  - the management by the rheumatologist, the general practitioner and the physical therapist;
  - the timing and method of evaluation.
6. The general practitioner and the physical therapist(s) should work according to their agreements on the management of patients with osteoarthritis of the hip and/or knee for a defined period of time, after which they should evaluate the progress made and if necessary adjust the agreements.



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