

Clinical practice guidelines for physical therapy in patients with osteoarthritis of the hip or knee

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Introduction

These clinical guidelines describe the diagnostic and therapeutic processes involved in providing physical therapy for patients suffering from osteoarthritis of the hip or knee. The information presented is expanded in the second part of this document, entitled "Review of the evidence", in which the choices made in arriving at the guidelines are described in detail. The guidelines and the review of the evidence can be read separately. The abbreviations used and the definitions of some important terms are explained in an appended list of abbreviations and glossary.

Target group

These guidelines are intended for physical therapists working in the primary and secondary healthcare sectors who treat patients with health problems directly related to osteoarthritis of the hip or knee. This includes those patients suffering from forms of general arthritis that involve arthritic problems in three or more different kind of joints. The therapeutic

principles outlined in these guidelines can also be utilized in group therapy and hydrotherapy. The guidelines do not cover the assessment and treatment of patients suffering from osteoarthritis of the hip or knee in whom multidisciplinary rehabilitation is needed. Treatment of these latter patients is mainly carried out by rehabilitation teams and, therefore, the treatment strategies (and the interventions) used might differ from those described in these guidelines.

Epidemiological data

Osteoarthritis is the most common joint disorder of the human body. The prevalence of osteoarthritis increases with age. Osteoarthritis is more often found in women than in men. Based on the registrations made by primary care physicians, it is estimated that, in 1994 in the Netherlands, 181,800 persons suffered from osteoarthritis of the hip and 295,600 from that of the knee. It is expected that the incidence of osteoarthritis will increase in the future as the percentage of individuals who are severely overweight increases.

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Currently in the Netherlands, there are no accepted uniform or general criteria for the diagnosis of osteoarthritis. Primary care physicians diagnose osteoarthritis on the basis of clinical symptoms, the location of the joint deformations and the patient's age. On occasion, an X-ray is made.

Prognostic factors

Osteoarthritis is a multifactorial disorder whose origin is often unknown. One important prognostic factor for osteoarthritis of the hip or knee is obesity. Other prognostic factors are: trauma involving joint damage; a hip or knee operation (for example, on the meniscus); developmental disorders (such as dislocation, Perthes disease, epiphysiolysis of the hip joint, genu varum or genu valgum; and participation in a physically demanding occupation or sport in which the patient has to kneel, squat, or lift heavy loads (for example, agricultural work or professional ballet). Usually, the prognosis of osteoarthritis of the hip joint is worse for women than men. If the caput femoris migrates ventrally in the acetabulum or if the osteoarthritis has an atrophic character (i.e. bone deterioration), the prognosis for the hip is poor. Factors that influence the progression of osteoarthritis of the knee include old age, obesity and general arthritis. Consequent future disabilities depend on current prognostic factors, on progression of the arthritis, and on any psychosomatic factors present. In addition, the existence of a co-morbid disease and of inappropriate pain behavior can both have an effect. Inadequate pain coping strategies can negatively influence the patient's suffering, quality of life and psychosomatic functioning. The prevention of trauma and reduction in overweight may have a positive impact on the development and course of osteoarthritis. The prevention of stress and strain on joints can prevent exacerbation.

Health problems

The most frequent problems resulting from osteoarthritis are damage to and deterioration of joint tissues and reactive uncontrolled bone growth in the joints. These phenomena can be coupled to joint inflammation. The most important impairments of osteoarthritis of the hip or knee are pain, morning stiffness, crepitations, reduced flexibility, reduced muscle strength and stability, joint deformation, and

reduced aerobic capacity. Most often, pain predominates. Pain can start when certain movements begin and mostly occurs when weight load on the joint increases. Pain persists during long walks and decreases with rest. In osteoarthritis of the hip, pain is mainly located in the groin and in the frontal and lateral areas of the hip joint. Pain can also occur locally or can radiate towards the thigh and knee. In osteoarthritis of the knee, pain is located in and around the knee joint, mainly on the dorsal side. Pain can also occur in the thigh and hip.

The various impairments can lead to diverse disabilities such as walking, climbing stairs, getting in and out of a car, cycling and putting on shoes. For a few patients, osteoarthritis can have an influence on their social participation. These patients experience problems with their family life, environment, occupation and education. This is especially the case for patients who not only suffer from osteoarthritis of the hip or knee but also from other disorders that lead to disabilities and participation problems.

Natural course

The outlook in persons with osteoarthritis of the hip or knee is variable. In the beginning, pain is intermittent. There can be a few episodes of exacerbation a year that do usually not last longer than a few weeks. During progression of the osteoarthritis, pain can worsen, both flexibility of the hip or knee joint and muscle strength can slowly deteriorate, and walking distance can decrease. It is possible for the pain to alleviate even though joint flexibility continues to decrease and the patient's level of functioning becomes more limited. Sometimes these patients can even function without pain or complaints. A smaller group of patients have serious disabilities and participation problems and they may suffer from pain during the night. Night pain is usually a sign of joint inflammation or very serious arthritis. Because symptoms are variable, many patients find it difficult to estimate how much they can participate in normal daily activities and to judge the prognosis and rate of progression of their osteoarthritis.

Coping with symptoms

Patients who look for distraction from their pain symptoms tend to take part in self-initiated activities

Table 1. Problem areas recognized in patients with osteoarthritis of the hip and knee.

Problem area	Definition
1. Active inflammatory impairments	Arthritis or synovitis with symptoms that include pain, impairments related to movement, (knee) hydrops and raised (knee) temperature
2. Pain	Pain that is not related to an active inflammatory process
3. Movement impairments (fear of movement not included)*	Impairments involving joint movement, muscular or active stability of the knee or hip joint, muscle contraction strength, muscle coordination, or flexibility
4. Disabilities	Limitations in activities such as squatting, kneeling, bending, walking, climbing stairs, self-care (e.g., washing, dressing and toilet use), and performing household chores (e.g., washing dishes, washing clothes, cleaning and cooking)
5. Participation problems	Problems with performing household chores or with taking part in an occupation, education, sport, hobbies or recreation
6. Inadequate pain behavior	Behavior in patients who experience very threatening ailments and who have a low levels of control over their disorder; there may be hindering factors in the environment, such as a partner's influence

* *Fear of movement is, according to the International Classification of Impairments, Disabilities and Handicaps (ICIDH), defined as an impairment in movement functions.*

and strive for an active lifestyle. These people have an adequate way of coping with pain. In contrast, those who, because of pain, do not exercise, stop taking part in certain activities and think that rest is the best strategy for tackling pain have an inadequate coping strategy. The way in which an individual copes with his* complaints depends on the patient's characteristics. In addition, interaction between the patient and his environment also plays an important role. This includes the interaction between patient and the physical therapist.

Patient's characteristics

The patient's characteristics make a distinct difference. On the one hand, there is the meaning a patient gives to his complaint and, on the other, there is the degree of control the patient has over the complaint. A large part of the emotional load on a patient is determined by the meaning he gives to the complaint and the way in which he allows himself to feel. This attributed meaning can vary from regarding

the complaint as being non-threatening to regarding it as being very threatening. The more threatening the complaint appears, the more inadequately the patient will cope. In terms of control, the patient will experience a large degree of control if he has knowledge about the complaint and has the feeling that it can be influenced.

Interaction between patient and environment

The physical therapist's attitude and the way he attributes to the patient's complaints has an influence on the course of the complaints. For example, paying too much attention to pain during a treatment session and not encouraging independence enough can have negative influences on prognosis. Social factors, such as the reactions of people in the patient's environment, for example, a partner or employer, play also a part.

Health profiles

In these clinical guidelines, six distinct health

* *The combination 'he/she' and 'his/her' have been avoided in these guidelines to facilitate readability. The terms 'he and 'his' should be understood to apply to both sexes.*

Table 2. Three distinct profiles of patients with osteoarthritis of the hip or knee.

Patient profile	Description
Patient profile A	The active inflammatory process in the joint is predominant; the most important complaints are pain and impairments related to movement of the hip or knee.
Patient profile B	The patient has episodes with pain complaints, impairments associated with movement, and gradually during activity; generally the patient looks for solutions to the problem himself and feels a high degree of self control; only during episodes of intense pain the patient needs extra guidance.
Patient profile C	The patient has a long-lasting or chronically recurring complaints; the disabilities and possible participation problems are of central concern; the patient regularly feels little or no control over the situation and makes little attempt to look for solutions to his problems.

problem areas are recognized in patients with symptoms resulting from osteoarthritis of the hip or knee: (I) inflammatory impairments; (II) pain; (III) movement impairments; (IV) disabilities; (V) participation problems; and (VI) inadequate pain behavior. See Table 1.

Three distinct patient profiles are described in these clinical guidelines (Table 2). They are based on problem areas that are central to progress of the disorder. These profiles provide global descriptions of patients that can be used during assessment and which highlight specific aspects of treatment.

Diagnosis

The aim of the diagnostic process is to document the severity, nature and extent of the health problem. The starting point is the patient’s testimony, including details of the most important complaints. The physical therapist makes an assessment of the problem areas of most immediate concern to the patient; decides which of the patient profiles listed in Table 2 best fits the patient; makes a prognosis; assesses whether the pain in the hip or knee is a direct result of osteoarthritis or is due to some other disorder (for example, bursitis); and assesses the patient’s need for knowledge and information.

Referral and first physical therapy visit

These clinical guidelines assume that the referral of a patient with genu osteoarthritis or coxa osteoarthritis comes from a primary care physician or medical specialist. Referral documentation should describe

not only the diagnosis, but also the reasons for referral. Supplementary referral information can include details of any medicine prescribed and of possible co-morbid conditions. The physical therapist also works with practitioners of other disciplines.

History taking

Through history taking, the physical therapist will gain information on and an insight into the following:

- The complaint, the most important complaints, and the patient’s expectations, including activity and participation goals.
- The health problem, with regard to their nature, progression and prognosis, including:
 - the severity and nature of impairments, disabilities and participation problems;
 - how the complaint commenced;
 - any long-term, chronic or repeating episodes of the complaints;
 - prognostic factors, including causative factors and helpful or hampering factors, such as the patient’s degree of control over the complaint, the patient’s motivation, the balance between (general and local) load and the patient’s load-bearing capacity, and psychosomatic factors; and
 - details of previous diagnoses, treatment and the results of treatment.
- The current situation:
 - the severity and nature of impairments, disabilities and participation problems that accompany osteoarthritis;

- the present general health situation, including the patient's functioning, activities, and level of participation;
- personal factors;
- current treatment, whether prescription medicine or other treatment; and
- the patient's need for knowledge and information.

Examples of questions that focus on the patient's coping strategy:

How have you been able to cope with the complaint so far?

What have you personally done to reduce your complaints?

To which extent are you able to predict the onset of your complaints?

How often have you been able to prevent the development of your complaints?

Which form of treatment do you think will help most and why?

Which hindrances and difficulties do you experience in performing your daily activities and which would you like to overcome?

History-taking also includes documenting severity of pain and pain tolerance. The working group that developed these guidelines decided to use a pain visual analogue scale (VAS) to do this. In order to record the extent of pain and disabilities, it is recommended that the algofunctional index for osteoarthritis is used. This index gives measures of pain, maximum walking distance, and the level of activity in daily life (Table 3). The patient's total score on the algofunctional index gives an estimate of the level of disabilities the patient experiences in performing activities in daily life (ADL): > 14: extremely severe disabilities; 11-13: very severe disabilities; 8-10: severe disabilities; 5-7: moderate disabilities; 1-4: minimal disabilities.

Recommended measuring instruments

- The Visual Analogue Scale (VAS) to assess the severity of pain and pain tolerance.
- The Algofunctional index for osteoarthritis to assess the pain and disabilities.

The algofunctional index and the VAS can be used to

determine the extent of pain and disability at initial assessment, during treatment, and in the middle and at end of individual treatment sessions. The Patient-Specific Complaint questionnaire can be used to document the most important complaints.

Assessment

Assessment comprises inspection, palpation and functional assessment. Inspection involves observing the patient, with most attention being given to the back, pelvis, hips, knees and feet. During inspection and palpation, the physical therapist assesses whether there are any deformations in joint position or any indications of active inflammatory processes. In addition, he will evaluate muscle tone in the lumbar extensors and the hip adductors (for hip osteoarthritis). Functional assessment evaluates how well the patient is able to participate in a number of daily activities, such as standing, standing on one leg, walking, sitting down, getting out of a chair, climbing stairs, bending at the knee (for knee osteoarthritis), picking up an object from the ground, and putting on shoes (for hip osteoarthritis). The physical therapist assesses which impairments any functional problems are related to by evaluating joint movement and stability, muscle tone, muscle strength, and the flexibility of the affected leg and the other leg. How extensive the functional assessment is depends on the seriousness on the health problem. During the evaluation of activities, the physical therapist takes into account how well the patient is coping with the complaints. For example, the therapist determines whether the patient has developed a fear of movement. The physical assessment registers the patient's situation at that moment in time. It must be seen in the context of daily activities. When the disease follows a very variable course, it can be useful that evaluations of osteoarthritis are repeated (see the section on evaluation below). Use of evaluation instruments such as the hand-held dynamometer and the goniometer are recommended for physical assessment.

Analysis

Making a decision on whether physical therapy is indicated is based on interpreting the information gained during history taking, the medical referral data, and the results of the physical assessment. The

Table 3. *Algofunctional index for osteoarthritis of the hip or knee.*

Osteoarthritis of the hip		Osteoarthritis of the knee	
<i>Pain or discomfort</i>		<i>Pain or discomfort</i>	
During nightly bed-rest:		During nightly bed-rest:	
none or not significant	0	none or not significant	0
only during movement or in certain positions	1	only during movement or in certain positions	1
in a resting position	2	in a resting position	2
Morning stiffness or decreasing pain after getting up:		Morning stiffness or decreasing pain after getting up:	
for 1 min or less	0	for 1 min or less	0
for more than 1 min but less than 15 min	1	for more than 1 min but less than 15 min	1
for 15 min or more	2	for 15 min or more	2
After 30 min standing	0–1	After 30 min standing	0–1
Walking:		Walking:	
none	0	none	0
only after walking a certain distance	1	only after walking a certain distance	1
immediately after starting to walk and increasing after a certain duration	2	immediately after starting to walk and increasing after a certain duration	2
after starting to walk but not increasing	1	after starting to walk but not increasing	1
After sitting for a long time (2 h)	0–1	Getting up from a chair without using arms	0–1
<i>Maximum walking distance (pain allowed)</i>		<i>Maximum walking distance (pain allowed)</i>	
Unlimited	0	Unlimited	0
More than 1 km, but with restrictions	1	More than 1 km, but with restrictions	1
Approximately 1 km (in about 15 min)	2	Approximately 1 km (in about 15 min)	2
Between 500–900 m (in about 8–15 min)	3	Between 500–900 m (in about 8–15 min)	3
Between 300–500 m	4	Between 300–500 m	4
Between 100–300 m	5	Between 100–300 m	5
Less than 100 m	6	Less than 100 m	6
With a cane or crutch	1	With a cane or crutch	1
With two canes or crutches	2	With two canes or crutches	2
<i>Daily life activities*</i>		<i>Daily life activities*</i>	
Bending over while putting on socks	0–2	Able to walk up stairs	0–2
Picking up an object from the floor	0–2	Able to walk down stairs	0–2
Walking up and down normal stairs	0–2	Able to squat or bend the knees	0–2
Getting in and out of a car	0–2	Able to walk on uneven ground	0–2
Total score		Total score	

* In the assessment of daily activities: without difficulty: 0; with little difficulty: 0.5; with moderate difficulty: 1; with great difficulty: 1.5; and unable to perform: 2.

following questions should be answered during analysis:

- Which problem areas are most important to the patient? For example, impairments related to

active inflammatory processes, pain, a reduction in functional activities related to movement difficulties (but not including the fear of movement), disabilities, participation problems,

or inadequate pain behavior.

- What is the prognosis? The prognosis should be evaluated in terms of timescale, course of patient's complaints and functioning, activities, participation, and should take into account the influence of promoting and hampering factors.
- Which patient profile does the patient fit? That is, A, B or C, as described above.
- Can the current problem areas be influenced by physical therapy? If so, to what extent?
- Is the patient motivated to participate in physical therapy?

Conclusion: Is there an indication for physical therapy? And can the patient be treated in accordance with the clinical guidelines?

If there is no indication for physical therapy, the physical therapist should contact the referring physician for consultation and advice. If necessary, the patient could be referred to another medical specialist.

Treatment plan

After answering the above questions, a treatment plan should be formulated in consultation with the patient. If the patient is currently receiving treatment from a practitioner of another discipline (for example, an occupational therapist), then the treatment being received will have to be adjusted. Treatment goals depend on the timescale of treatment, which is determined by the patient profile and the patient's central problem areas. The most important treatment activities are giving information and advice, and exercise therapy. The starting points for planning information provision are the patient's needs for information, advice and coaching, which would have become apparent during the diagnostic process. The information plan can be split into four parts: informing, instructing, educating and guiding. In practice, these four activities will overlap.

Therapy

The central goal of physical therapy is to decrease the problems associated with osteoarthritis: to reduce pain, to decrease disability and to lessen any resulting participation problems. In other words, the patient's levels of activity and participation should be

optimized. For patients fitting any of the three patient profiles, the general sub-goals are to provide insight into the disorder and the treatment. The following items should be covered: the nature and course of osteoarthritis; the details of therapy, including therapeutic goals, type of treatment and estimated treatment duration; risk factors; and prognostic factors. The physical therapist's approach to treatment should take into account: disabilities, for example, in walking, bending over or sitting down; any existing participation problems, such as problems taking part in housework or paid employment; impairments, such as decreased mobility, atrophied muscles or poorer stamina; and an inadequate coping strategy. During the therapeutic process, the physical therapist will evaluate the treatment goals systematically (see the section on evaluation below).

Central aims of the therapeutic process are:

- to stimulate the patient's functioning, activities and level of participation; and
- to encourage the adoption of an adequate way of dealing with the complaint.

The results that can be achieved by physical therapy depend on the patient profile and the central problem areas. During all phases of treatment, the physical therapist must pay attention to the patient's coping strategy. The adoption of a behavioral approach is important in treating patients with inadequate pain behavior (see therapy details for patient profile C, described below). Instruction on time management, the need for rest periods, and relaxation is essential for patients who take on too many activities.

The adoption of a behavioral approach is important in treating patients with inadequate pain behavior

Patient profile A: osteoarthritis of the hip or knee with arthritis or synovitis

In this patient profile, treatment is directed at the first two problem areas: the impairments are associated with an active inflammatory process and pain (see Table 1, above). The presence of night pain and an inability to bear weight on a joint, when standing or lying on one side, indicates the existence of an active inflammatory process. In knee joints

specifically, swelling and an increase in temperature are associated with active inflammatory processes. During this active phase, physical therapy focuses on teaching the patient how to deal with the inflammatory process (i.e. how to prevent strains and how to balance load and the load-bearing capacity of the joint) and on encouraging activities compatible with the load-bearing capacity of the joint. When the inflammation decreases, the focus of treatment can be shifted to coping strategies, if necessary, and to pain reduction (see details of therapy for patient profile C, described below).

Problem area 1: impairments related to active inflammatory processes

Objectives: to ameliorate impairments related to inflammatory processes and to increase the patient's insight into the relationship between joint load and joint load-bearing capacity.

Interventions:

- informing and advising the patient about the relationship between joint load and joint load-bearing capacity;
- exercise therapy in which the load applied is within the limits of the joint's load-bearing capacity (involves passive, guided active and active movement);
- giving instruction, if necessary, on the use of walking aids, such as a crutch or a cane in the contralateral hand;
- giving transcutaneous electrical nerve stimulation (TENS) for pain reduction in the knee, if necessary; and
- applying short cold-pack treatment to the knee when there is an indication of severe inflammation, or to lessen pain.

Problem area 2: pain

Objectives: to reduce severity of pain, to improve the patient's pain tolerance, to increase joint load-bearing capacity, and to prepare the patient for resuming normal activities.

Interventions:

- informing and advising the patient about the relationship between joint load and joint load-bearing capacity;

- exercise therapy in which the load applied is within the limits of the joint's load-bearing capacity (involves passive, guided active and active movement);
- giving instruction, if necessary, on the use of walking aids;
- applying traction to the joint (hip or knee) in a resting position to reduce pain, if necessary.

The use of TENS is advised only in problem area 1, in osteoarthritis of the knee. Scientific research shows that the use of other forms of electrotherapy, such as ultrasound therapy or laser therapy, does not result in improvement, and therefore these forms of electrotherapy are not recommended in these guidelines.

Patient profile B: osteoarthritis of the hip or knee 'without' arthritis but with episodic pain and disabilities

Here, treatment is directed at the third and fourth problem areas: movement impairments and disabilities. If necessary, therapy may also focus on inadequate pain behavior (see details of therapy for patient profile C, described below). The physical therapist guides the patient through the process of regaining control during ADL, sport, hobbies and work. Monitoring the patient and following his progress over time during this process form central components of treatment. Therapy is directed at stimulating functions and activities, and, if necessary, helping the patient to cope with the complaints.

Problem area 3: movement impairments (but not including fear of movement)

Objective: to reduce movement-related impairments by improving muscle strength, capsular and myogenic flexibility, muscle stability and coordination.

Interventions:

- informing and advising the patient on how to build up joint load relative to joint load-bearing capacity and on how to build up joint load over time;
- providing functional stimulation (which involves muscle strength, joint mobility and stability, for example) while building up joint loading duration

- and intensity to achieve optimal extension;
- physically moving joints in the direction of the impairment to increase movement capacity, if necessary (doing this under traction is a possibility);
- giving instruction, if necessary, on the use of walking aids and drawing attention to other possible aids, such as support or correction inlays, that help postural deformations. It is necessary to obtain advice from the referring physician before treatment is carried out by a practitioner of another discipline, such as a podiatrist, occupational therapist or rehabilitation physician.

Problem area 4: Disabilities

Objective: to improve the performance of activities such as bending over, kneeling, walking, climbing stairs, washing, dressing, using the toilet, cleaning and cooking.

Interventions:

- informing and advising the patient on how to build up joint load relative to joint load-bearing capacity and on how to build up joint load over time;
- encouraging activities while building up joint loading duration and intensity;
- giving instruction, if necessary, on the use of walking aids (see problem area 3 above).

Patient profile C: osteoarthritis of the hip or knee 'without' arthritis but with chronic pain and disability

Here, treatment is directed at the fourth and fifth problem areas: disabilities (see patient profile B) and participation problems. In those patients who experience their complaints as being threatening or who do not have sufficient control over their complaints, the treatment will also be directed at the sixth problem area, inadequate pain behavior. Increasing self-control is an important aspect of treatment. The patient will have to learn the skills needed to resolve problems by himself and to learn to 'feel' how to cope with the complaints accompanying osteoarthritis. The starting point for therapy involves establishing a baseline measurement. The physical therapist and the patient together formulate goals regarding the desired levels of activity and

participation and discuss the therapy plan. Practitioners of any other disciplines involved and the patient's employer should be consulted, if necessary.

Problem area 5: participation problems

Objective: to optimize the patient's participation in housework, education and sport, and in his occupation, various duties, hobbies and recreational activities.

Interventions:

- informing and advising the patient about participation in activities such as housework or those necessary for carrying out his profession;
- increasing, through exercise, the level of activity associated with daily tasks, sport and hobbies while building up joint loading duration and intensity;
- giving instruction, if necessary, on the use of walking aids and drawing attention to other possible aids and to alterations that could be made in the patient's home or work environment (see problem area 3 above).

Problem area 6: inadequate pain behavior

Objective: to encourage the patient to adopt an appropriate way of coping with his condition. The patient will then experience his condition as being less threatening, will understand it better, and will feel that he can influence it.

Interventions:

- informing and advising the patient about the true significance of his complaints while, at the same time, encouraging the patient to gain control over the complaints. It is important that the right information (see below) is given and that ambiguity is avoided. If the patient's partner appears to be very concerned, it is advisable to provide information and advice for the partner as well.
- encouraging compliance with therapy. The learning process involves continuously bringing the functions, activities and movement behavior learned in daily life back into the therapy sessions;
- encouraging activities with an increase in the load (duration and intensity), at set times, regardless of

the pain (time-contingent) and in a graded manner ('graded activity'). The physical therapist should create a comfortable atmosphere during exercises. Exercise therapy should start at a level below the lowest level determined during baseline measurement;

- changing aspects of the patient's environment from acting as a barrier to acting as a facilitator by, for example, involving the patient's partner or employer. If the partner pays attention only to pain behavior and to what 'can't be done' because of pain, the partner will have to learn to focus more on encouraging adequate pain behavior.

Examples of providing the 'right information' include saying: "Based on the information I have, you can do more than you think and that's what we are going to work on together"; or "Scientific research proves that exercise helps"; or "Increasing pain may be felt at the beginning of movement and pain may occur after the end of the therapy session, but that doesn't necessarily mean that something is wrong."

Evaluation

The results of therapy should be evaluated every two weeks on the basis of the goals and objectives that were set (in terms of impairments, disabilities and participation problems) and on the basis of the patient's level of activities. The evaluation will take into account the patient's history, observations of the patient's mobility, and any measurements taken, for example, using a goniometer or a hand-held dynamometer. If necessary, treatment goals and therapeutic activities can be updated on the basis of the results of the evaluation. An increase in the level of complaints during therapy can be the result of active inflammatory processes. The physical therapist should then assess the severity of the inflammation and, if necessary, send the patient back to the referring physician or medical specialist for the consideration of other treatments, such as anti-inflammatory medications. Patients with chronic complaints must undergo a thorough evaluation six weeks after the treatment started using the Algofunctional Index and the VAS. The physical therapist should determine whether any changes have occurred in the patient's level of complaints and whether it is worthwhile continuing therapy. If no

changes are found, the physical therapist should estimate the degree of improvement expected in the subsequent period of treatment. A final evaluation should take place after a minimum of six weeks. During this final evaluation, measurements obtained using the VAS and the Algofunctional Index can be compared with the values obtained at the beginning of treatment.

Treatment duration and frequency

A minimum of six weeks' treatment is advised to ensure that patients experience some benefits of treatment and undergo behavioral changes. For patients fitting patient profile A, the treatment frequency depends on the amount of guidance needed. For those fitting patient profile B, the frequency should be as low as possible, usually only a few visits are needed. For those fitting patient profile C, the treatment frequency is usually low and the treatment duration longer. One important aspect of therapy in patients with osteoarthritis of the hip or knee is encouraging the continuation of exercise both during and after treatment. It is advisable to spread treatment sessions out over a reasonable period of time in order to give patients a chance to make follow-up appointments. This increases patients' motivation to hold on to the improved condition they have achieved and the new behavior (or condition) they have adopted.

One important aspect of therapy in patients with osteoarthritis of the hip or knee is encouraging the continuation of exercise both during and after treatment.

Treatment conclusion and reporting

The referring physician will receive a final report and also, if necessary, a report during treatment. In these reports, he will be informed about the treatment goals, the results of treatment, and advice given by the physical therapist. Information on reporting is given in the KNGF-guidelines 'Communication and information report to the primary care physicians'. The written report should be made according to the KNGF-guidelines 'Physical therapeutic documentation and report'. To ensure good communication and information exchange between primary care physician and physical therapist, the following five

items can be helpful: Indication setting, Consultation, Referral, Contact during treatment, and Reporting.

Follow-up

At the end of the treatment, the physical therapist should encourage the patient to continue being active, to walk and to cycle. Over the long term, it is easier for patients to continue exercising weekly if it is in a form that the patient enjoys and it is carried out in a group setting. The physical therapist can refer the patient to any local exercise or self-help classes that have been specially developed for patients with osteoarthritis of the hip or knee. In the Netherlands, these programs go under such titles as 'Hup met de heup', 'Omgaan met artrose' and 'Bewegen voor ouderen' (preferably in heated water).

Review of the evidence

The KNGF-guidelines 'osteoarthritis of the hip or knee' provides a guide for the physical therapy treatment of patients with health problems related to osteoarthritis of the hip or knee. The guidelines describe the diagnostic and therapeutic process in line with the methodic physiotherapeutic conduct. In the Netherlands there are at the moment one other guidelines available dealing with diagnostics and treatment of osteoarthritis of the hip or knee, namely the NHG-standard 'Non-traumatic problems of the knee in adults'.¹ The two guidelines are for the greater part in line with each other.

Definition

KNGF-guidelines are defined as 'a systematic development form a central formulated guide which has been developed by professionals focusing upon the context of the methodic physical therapy treatment according to certain health problems and aspects which have to do with the organization of the profession'.²⁻⁴

Goal of the KNGF-guidelines: Osteoarthritis of the hip or knee

The goal of the guidelines is to describe the 'optimal' physical therapy treatment (effectiveness, efficiency, and tailored care) for patients with health problems related to osteoarthritis of the hip or knee, which will lead to a decrease in impairments, disabilities and participation problems based upon current scientific research.

Results from research show that there is a large variation between the therapy goals, interventions and the magnitude of physical therapy care.⁵ Besides the above mentioned goals, the KNGF-guidelines are explicitly meant to:

- change the care in the desired direction based on current scientific research and improve the quality and the uniformity of this care.
- assure insight into tasks and responsibilities and to stimulate cooperation.
- Support the physiotherapist in the decision making with regard to treatment or no treatment and applying the diagnostic and therapeutic interventions.

To make use of the guidelines recommendations are formulated with regard to professionalism and expertise which are necessary to insure treatment according to the guidelines.

Presenting the clinical questions

The working group which has formulated these guidelines wanted to attain an answer on the following questions:

- How big a problem is the osteoarthritis of the hip or knee?
- How is this diagnosed?
- Which risk factors and prognostic factors are known for, respectively, the cause and prognosis of osteoarthritis?
- Which health problems can be distinguished in patients with osteoarthritis of the hip or knee?
- Which risk and prognostic factors can be influenced by physical therapy?
- Which parts of the physical therapeutic diagnostic assessment are valid, reliable and useful in daily practice?
- Which forms of treatment and prevention are useful?

Patient population

These KNGF- guidelines deal with patients with health problems related to osteoarthritis of the hip or knee. These patients can also have generalized osteoarthritis, meaning osteoarthritis in three or more different kinds of joints.

Formation of the mono disciplinary working group

In May 1998 a mono disciplinary working group of professionals was formed to answer these clinical questions. In the formation of the working group an attempt was made to achieve a balance in professionals with experience in the area of concern or with an academic background. All members of the working group have stated that they had no conflicting interests what so ever in relation to the development of the KNGF- guidelines. The development of the guideline took place from May 1998 until June 2000.

Procedure of the mono disciplinary working group

The guidelines have been developed according to the 'Methods for the Development and Implementation of Clinical Guidelines'.^{2-4,6} This method includes practical instruction of the strategies used to collect literature. In the continuation of the review of evidence in these guidelines the specific terms used for the search, the sources used, the period in which the literature was published, and the inclusion or exclusion criteria for the literature are mentioned. The recommendations for the therapeutic process are almost solely based on scientific evidence. If there was no scientific evidence available, the recommendations were formulated based upon consensus within the working group or group of professionals. The recommendations are commented upon by external professionals. After finishing the concept of the guidelines this was sent off to external professionals and/or occupational organization (secondary working group) for comments on the recommendations and agreement and consensus with other occupational organizations and/or other mono or multidisciplinary guidelines. Also the wishes and preferences of patients are taken into account by representation of the 'Confederation of Rheumatic Patients'.

The members of the working group have individually selected and graded the proceedings attaining to the scientific evidence. Although the members of the working group have individually or in small subgroups selected and graded the scientific evidence, the result is laid out and discussed within the whole working. The scientific evidence is then summarized in a conclusion, including the extent of the evidence. Besides the scientific evidence there are other important aspects for making the recommendations such as: reaching a general consensus, efficiency (costs), resource availability, necessary expertise and education, organizational aspects and the attempt for agreement with other mono or multidisciplinary guidelines

Validation by the intended users

Before publication and distribution, the guidelines are reviewed and systematically tested by the intended users (validation). The concept of the KNGF-guidelines 'osteoarthritis of the hip or knee' was sent off to a randomly selected group of 45 physical therapists working in different working environments

for assessment. The comments and remarks from the physical therapists are documented and discussed in the working group and if possible and/or desired included in the final guidelines.

The recommendations for the practice are the result of the available evidence, the above mentioned other aspects and the results of testing the guidelines amongst the intended users.

Systematical methods to search the scientific evidence

To support the recommendations related to the diagnostics, use of measuring instruments and the therapy, the literature is collected via computer-aided searches in Medline, Cochrane and DocOnline of the Dutch Institute of Allied Health Professions over the period 1990-1999.

Constitution, products and implementation of the guidelines

The guidelines constitute of three parts: the practical guidelines, a schematic layout of the main points of the guidelines (summary) and the review of evidence section. All parts of the KNGF- guidelines can be read individually. Aside from the publication and distribution of the guidelines amongst members of the KNGF, there is a segment promoting professionalism developed and published to stimulate the use of the guideline in daily practice.⁷ The guidelines are implemented according to a standard of implementation strategies which are described in the method.^{2,3,6,8}

Introduction

In this section, the approach adopted in the KNGF-guidelines for physical therapy in patients with osteoarthritis of the hip or knee is explained in detail. Recommendations on treatment are evidence-based, where possible. A search of the literature, from 1990 to 1999, was carried out using the MEDLINE, Cochrane Library and DocOnline databases, and a database belonging to the Documentation Center of the NPi (Dutch National Institute of Allied health Professions). The following keywords were used in the search, in Dutch and English: osteoarthritis, clinical guidelines, randomized clinical trial (RCT), meta-analysis and physical therapy. Additional literature was also obtained from professionals and through

literature referrals in articles.

The guidelines issued by the Dutch College of General Practitioners on non-traumatic adult knee problems¹ advises guided exercise therapy by a physical therapist if the advice and medication given by the primary care physician has not produced the expected results. Providing exercise therapy and giving information and advice to patients are also of central importance in the KNGF- guidelines discussed here. The physical therapist treats, guides and coaches the patient and encourages the adoption of appropriate pain and movement behavior. The interventions used are tuned to the specific problem areas and patient profile, as described in Tables 1 and 2 above, that apply to the patient being treated. The KNGF- guidelines are based on the English and American guidelines entitled "Guidelines for the diagnosis, investigation and management of osteoarthritis of the hip or knee" and "Guidelines for the medical management of osteoarthritis of the hip or knee", respectively.⁹⁻¹¹ The guidelines encapsulate the following elements of the total healthcare process: guided exercise therapy by a physical therapist; advice, information and education for patients, including the use of self-help programs; nutritional advice for obese patients; and advice on orthopedic aids.

Impairments, disabilities and participation problems

Physical therapists describe the health problems associated with osteoarthritis of the hip or knee in terms of (impairments in) functions and structures, (disabilities in) activities and participation (problems). Definitions of these terms are given in the International Classification of Impairments, Disabilities and Handicaps.¹² An example of a functional impairment is decreased joint mobility. Primary care physicians use the term dysfunction, which has a broader meaning and focuses more on disabilities and participation problems.

Defining health problems

These clinical guidelines describe the diagnostic and therapeutic processes involved in providing physical therapy for patients suffering from osteoarthritis of the hip or knee. The hip and the knee are covered by one set of guidelines because both joints form part of the

same movement chain and because there are many similarities in the diagnostic and therapeutic processes, especially with regard to the patient's level of activity and participation. Osteoarthritis of the ankle is not included. For ankle problems, the reader should refer to the KNGF guidelines entitled 'Chronic ankle sprains'. Moreover, the present guidelines provide no information on physical therapy that is given either before or after treatment involving arthroscopy, osteotomy or a joint replacement operation.

Target group

These guidelines are written primarily for physical therapists working in the primary and secondary healthcare sectors who are dealing with patients with health problems that are treated in a similar way to the problems associated with osteoarthritis of the hip or knee. These patients can also suffer from general arthritis, that is, arthritis affecting three or more joints. The therapeutic principles described in these guidelines can also be applied during hydrotherapy in a group setting. The guidelines do not cover the assessment or treatment of hip or knee arthritis in those who need intensive rehabilitation in a multidisciplinary setting. For these patients, treatment should be provided by a rehabilitation team. Consequently, the treatment strategy may differ from that presented in these guidelines.

Physical therapists who treat patients with osteoarthritis of the hip or knee must have specific knowledge and experience. Knowledge is attained through a bachelor degree program and follow-up workshops and courses, and experience is gained by working with this patient group. The physical therapist must have knowledge about: the natural course of arthritis, including the pathologic and physiologic processes involved; the principles of relating load to load-bearing capacity; the influence of behavioral factors on pain; behavioral aspects of functional mobility; and how to provide to information to patients. A professional approach to giving information to patients depends on having knowledge of and an insight into the information involved and on being able to present it in a way that is appropriate to the context. Furthermore, the physical therapist should keep up to date with the relevant scientific and clinical literature.

Epidemiology

Osteoarthritis is the most common joint disorder of the human body.¹³ The risk of osteoarthritis increases with age¹³ and women suffer more frequently than men.¹⁴ On the basis of registrations made by primary care physicians, it is estimated that, in 1994 in the Netherlands, 181,800 persons suffered from osteoarthritis of the hip and 295,600 from osteoarthritis of the knee.¹⁵ These figures only indicate those patients who visited their primary care physicians and, therefore, do not apply to the general public. In 1994 in the Netherlands, it was estimated that 29,000 persons had osteoarthritis of the hip and 46,600 had osteoarthritis of the knee.¹⁵ It is expected that the incidence of osteoarthritis will increase in the future as the percentage of individuals who are severely overweight increases.¹⁶ In 1990, Dutch primary care physician practices recorded that 10-13 registered patients per 1000 had osteoarthritis of the hip and 16-20 per 1000 had osteoarthritis of the knee.¹⁷ According to research carried out in Rotterdam, 70% of patients with pain in the hip or knee who visited their primary care physician had a diagnosis osteoarthritis or arthritis. Of these, 65% went to a physical therapist and 25% regularly used pain killers.¹⁸ Physical therapists working in the primary healthcare sector in the period from 1989 until 1992 who were monitored by the Dutch BEEF project registered 17,201 patients and 25,590 indications for referral. A maximum of four referral indications was recorded for each patient. Of this total, 2% were referred with the indication osteoarthritis of the hip or knee: 1.3% (n = 333) had rheumatoid arthritis of the knee and 0.6% (n = 154) had rheumatoid arthritis of the hip.¹⁹

Diagnosing osteoarthritis

Classification criteria for diagnosing osteoarthritis of the hip or knee have been suggested by the American College of Rheumatology (ACR) and the World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians (WONCA).⁽²⁰⁻²³⁾ In the Netherlands, ACR criteria are not used by physicians in primary care but are used in scientific research.¹⁴ In addition, the WONCA criteria are not used very often by primary care physicians. Dutch primary care physicians diagnose osteoarthritis of the

hip or knee on the basis of clinical symptoms, the location of the joint disorder, and the patient's age.²⁴ These are also the criteria on which the KNGF-guidelines are based. The Dutch College of General Practitioners (NHG)-guidelines on non-traumatic adult knee problems¹ define no clear relationship between symptoms and abnormalities seen on radiography. Patients who appear to have an arthritic disorder on X-ray do not necessarily have the complaint. Moreover, it is also possible that patients whose X-rays do not show abnormalities do have the complaint. The treatment and advice given by primary care physicians is largely dependent on the patient's complaints. X-ray data has no influence on treatment.

Prognostic factors

The origin of osteoarthritis

Cohort studies have been used to determine prognostic factors. In two cohort studies,^{25,26} it was shown that obesity is important for the development of osteoarthritis. In a retrospective cohort study,²⁷ Felson concluded that the relationship between obesity and osteoarthritis of the hip is less strong than the relationship between obesity and osteoarthritis of the knee. In another study, Vingård²⁸ noted that the performance of occupations involving hard physical labor, which includes for example kneeling or heavy lifting, is strongly linked to the development of osteoarthritis of the knee and might be a common factor in the development of osteoarthritis. One case-control study²⁹ showed a relationship between osteoarthritis of the hip and agricultural work (odds ratio = 3.8).³⁰ Other possible prognostic factors for the development of osteoarthritis of the hip or knee are: congenital or developmental disorders of the hip (e.g. congenital dislocation, Perthes disease, and epiphysiolysis of the femur) or the knee (e.g. genu varum or genu valgum) and previous trauma in the hip³¹ or knee.²⁶ Recent publications describing retrospective cohort studies demonstrate that sports involving large forces on the hip or knee joints can result in the development of osteoarthritis of the hip or knee.³¹⁻³³

The progression of osteoarthritis

Hochberg³⁴ described a number of prognostic factors in a review. For example, the prognosis of

osteoarthritis of the hip joint is frequently worse in women than men. In addition, if the caput femoris has migrated ventrally in the acetabulum or the osteoarthritis has an atrophic character (i.e., it involves bone deterioration), a worse prognosis is indicated in the hip.³⁵ Factors that influence the progression of osteoarthritis of the knee include old age, obesity and general arthritis.³⁶ There is no evidence that losing weight leads to an improvement in osteoarthritis.³⁷ The existence of a co-morbid complaint, such as a heart or lung disorder, makes the risk of disabilities in patients with osteoarthritis of the knee greater than that in patients with osteoarthritis alone.³⁸ The results of prospective studies³⁹ also show that patients who have osteoarthritis of the hip or knee along with other disorders that limit mobility are more likely to experience pain and joint problems that limit daily activities, and more psychosocial problems which may lead to a decline in quality of life. Other factors that influence pain are the patient's feelings of helplessness, educational level, and body mass index.⁴⁰ There is evidence that moderate and, for the patient, sensible movement activities and adequate pain behavior have a positive effect on, on the one hand, the patient's complaints⁴¹ and, on the other, joint function. Catastrophizing⁴² and somatic complaints⁴³ are associated with worse prognosis.

Prevention

It is possible that preventing trauma and reducing weight could have a positive influence on the development and the natural course of osteoarthritis.^{15,44} The risk of osteoarthritis is greater when there is long-term repetitive local strain such as occurs in professional ballerinas and those who perform hard physical labor. Preventative actions may also decrease the number of exacerbations.⁴⁴

Health problems

The most important characteristic of osteoarthritis is the resulting damage to and loss of joint cartilage.⁴⁵ Damage may not be spread evenly over the whole joint surface. Along with cartilage loss, there is also the risk that cartilage fragments are deposited in the joint cavity, that changes in bone tissue can lead to the formation of osteophytes, and that synovial fluids may be affected by inflammation. Loose fragments

can cause mechanical restrictions and swelling of the joint capsule. Osteophytes can increase joint pressure. In the beginning, the pain and pathologic changes seen in osteoarthritis have an intermittent character. The pain is a so-called 'starting pain' that decreases when the patient moves longer and eventually increases again when the joint is strained or remains in motion for a long period of time. In later stages, pain can be constant, lasting 24 hours a day.^{45,46} Then, pain worsens when the patient is mobile and decreases with rest.

One possible origin of pain is the accumulation of waste material, which can cause inflammation, leading, in turn, to prostaglandin formation in the joint.⁴⁵ Pain could also result from the stimulation of nerves with nociceptors. Pain is usually the patient's main complaint. In osteoarthritis of the hip, pain is mainly located in the groin and in the frontal and lateral hip areas. It may be local or radiate to the lateral thigh or knee area. In osteoarthritis of the knee, pain is located inside and around the knee, especially on the dorsal side. It may also be located in the thigh or hip area.⁴⁷ Specifically associated with osteoarthritis of the knee are the occurrence of local pressure points on osteophytes and at the joint interface and the observation of crepitations while moving.

Abnormal strain on joint ligaments can lead to muscle atrophy, to a decrease in muscle strength and flexibility, to postural deformities, and to instability.^{45,48} Stiffness is also a frequent and important symptom of osteoarthritis. Eventually, the patient's performance of daily activities such as walking, dressing, washing and using the toilet becomes limited.⁴⁹ Decreased muscle strength results in increased pain and limits daily activities.^{50,51} Decreased joint mobility also leads to a decrease in activities.⁵¹ Coping behavior and psychological factors such as depression, fear, negative affect and avoidance behavior can influence pain and impairments in movement functions, and disabilities.^{50,52-54} Osteoarthritis can lead to absence from work and to claims for disability insurance payments.⁵⁵ Impairments and disabilities can lead to a decline in quality of life.⁵⁶ Patients who, in addition to osteoarthritis, also have other disorders that cause functional limitations are in a more fragile condition because they usually have more pain, experience

more influence of the symptoms in daily life and more psychosocial problems, all of which lead to a decline in quality of life.⁵⁶ 'Seeking social support' as a way of coping strategy appears to be a more important predictor for the quality of life than the chronic pain or physical disabilities. Individuals who have difficulty in opening up and talking about their health problems with others have the poorest quality of life.⁵⁶

Natural course

Very little systematic research has investigated the natural course of osteoarthritis. It appears that symptoms are variable and are worsened by strain and unusual joint movements.¹⁵ Exacerbations occur a few times a year and last no longer than a couple of weeks. As osteoarthritis progresses, pain can increase, and the mobility and strength of the hip or knee can decrease, thereby leading slowly to disabilities. However, pain can also decrease despite an increase in functional impairments and despite the disabilities.¹⁵ Patients may, therefore, be able to function without complaints and pain. There is a small group of patients with severe disabilities and participation problems, and in whom pain is constant for 24 hours a day. The occurrence of constant pain that is present in the middle of the night and while resting is usually a sign of very severe osteoarthritis, which may require an operation.³⁴ Complaint variability can make patients uncertain about how they should perform their daily activities and about the natural course and prognosis of their osteoarthritis.

Coping with complaints

People can cope with complaints in either a positive or a negative way. The way a patient copes with pain determines the relationship between chronic pain and the resulting disabilities.⁴¹ Coping can be active or passive and has been defined as 'the cognitive and behavioral means of dealing with internal or external influences that are created by stress and which the individual must understand, reduce and tolerate'.⁵⁷ Continuing, or trying to continue, to function despite substantial pain is referred to active coping. It can be achieved, for example, by seeking out activities that distract attention from the pain and by maintaining an active lifestyle. Being dependant on

others to control pain and the disabilities is a form of passive coping.⁵⁸ These latter individuals do not exercise, avoid certain activities, and adopt a strategy of resting to lessen pain. A physically active lifestyle has a positive effect on pain; the use of rest as the only means of decreasing pain can have a negative effect.^{44,54,59,60} The way in which a patient deals with pain is dependant on (A) the patient's characteristics, on (B) the interaction between patient and physical therapist, and on (C) the patient's interaction with his or her environment.

A. Patient's characteristics

The patient's characteristics determine how he gives meaning to the complaint and how much control he has over the complaints. It also determines whether there is inappropriate cognition about pain.⁶¹ The term cognition refers to subjective perceptions and to the interpretation of stimuli. A distinction is made between attribution and expectation. Attribution involves interpreting events and searching for possible explanations for the present situation. If the interpretation of stimuli or the present situation does not coincide with reality, the patient is making a logical error. One of the most common logical errors occurs when the patient regards the pain and the situation producing it as being very threatening, a catastrophe. Expectations, on the other hand, may involve anticipating pain and experiencing a degree of control over pain. The locus of control is defined as 'the point where the person has control over the event'.⁶² If the patient experiences his or her behavior as being controlled internally, for example because he or she has control over his or her own healthcare, there is said to be an internal locus of control. If behavior is felt to be controlled externally, because someone else, perhaps the physical therapist, or some situation is regarded as controlling the patient's healthcare, there is said to be an external locus of control.⁶³ An internal locus of control is often combined with active coping and leads, therefore, to a more successful way of dealing with pain.⁵⁸ Motor behavior depends on both attribution and expectation. A patient with avoidance behavior will avoid certain situations because pain is anticipated on the basis of past experience.⁶¹ If a patient engages in catastrophic thinking, avoidance can lead to fear of movement, that is, to fear that

movement will lead to the recurrence of pain or injury. This fear does not have a so much to do with pain intensity but it results from catastrophic thinking. Details are given in the 'cognitive-behavioral model' of chronic pain proposed by Vlaeyen et al.⁶¹ This model describes how the experience of pain is more likely to result in a fear of movement and avoidance behavior in patients who tend towards catastrophic thinking. Fear of movement then leads to greater movement avoidance.

B. Interaction between patient and physical therapist

The physical therapist's attitude and the way he deals with the patient's complaint can influence the natural course of the condition. For example, paying too much attention to pain during treatment and not encouraging independence enough can have negative influences.

C. Interaction with the environment

Social support provides help in times of difficulty and when the patient is getting used to changes. The most important source of support is the patient's partner. Individuals suffering from back pain who receive social support recover and pick up the pieces of their life faster. On the other hand, social support can contribute to the maintenance of complaints. For example, if the patient's partner takes responsibility for everything, this can lead to the continuation of errors in logical thinking.⁶⁴

Patient profiles

There are six problem areas for patients suffering from osteoarthritis of the hip or knee: (i) impairments related to active inflammatory processes; (ii) pain; (iii) impairments related to movement; (iv) disabilities; (v) participation problems; and (vi) inadequate pain behavior. In addition, the physical therapist can classify patients as having one of three defined patient profiles on the basis of their problem areas and the natural course of their complaint. Each of the three patient profiles given below describes the patient as he or she appears during assessment and provides a context for treatment.

Patient profile A. In this type of patient, active

inflammatory processes predominate. The most important complaints are pain and impairments related to mobility of the hip or knee. The presence of night pain and an inability to bear weight on a joint, when standing or lying on one side, indicates the existence of an active inflammatory process. In knee joints specifically, swelling and an increase in temperature are associated with active inflammatory processes.

Patient profile B. This type of patient has impairments related to movement which gradually results in disabilities as well as episodes of pain. Normally the patient seeks solutions for his problems on his own and he has a high level of self-control. Only during these episodes, the patient has contact with (para)medical services.

Patient profile C. This type of patient has a long-lasting, chronically recurring complaint, meaning that the patient has had complaints for longer than twelve weeks. Of central importance are disabilities and participation problems. Often, the patient has very little feeling of control and does not make an active effort to solve his problems.

Diagnosis

A methodical approach to providing physical therapy is based on a problem-solving process.⁶⁵ There are a number of different phases in treatment. Firstly, there is the referral from the primary care physician or medical specialist and the patient's testimony. Next comes history taking, followed by assessment, and then formulation of the physical therapy diagnosis. The physical therapist decides whether treatment is necessary or not. If there is an indication for therapy, a treatment plan is made. Evaluations take place both during and at the end of the course of therapy. The final phase is terminating therapy and reporting back to the referring physician.⁶⁶⁻⁶⁸

The aim of the diagnostic process is to document the severity and the nature of the health problem and the extent to which it can be influenced. The starting point is the patient's testimony, including the most important complaints. The physical therapist determines which problem areas are most important

to the patient, decides which patient profile best fits the patient, assesses whether pain in the hip or knee is a direct result of osteoarthritis or is the result of another disorder (for example, bursitis), and determines the patient's need for information.

Referral and first physical therapy visit

These clinical guidelines assume that the referral of a patient with genu osteoarthritis or coxa osteoarthritis comes from a primary care physician or medical specialist. Referral documentation should describe not only the diagnosis, but also the reasons for referral. Supplementary referral information can include details of any medicine prescribed and of possible co-morbid conditions. The physical therapist

also works with practitioners of other disciplines.

History taking

Table 4 provides a detailed description of the history-taking process in patients with osteoarthritis of the hip or knee.

The advice given in the guidelines is to make use of the pain visual analogue scale (VAS) and the Algofunctional Index to assess patients quantitatively. Both these methods can provide reference values for following the patient's progress over time. The patient's level of pain and disabilities in ADL can be measured during assessment, during therapy and at the end of a course of therapy. Progress can then be

Table 4. Questions to be answered during history taking in patients with osteoarthritis of the hip or knee.

Investigation of the patient's complaints and expectations

- What are the patient's most important complaints in Activities of Daily Life (ADL) in terms of impairments, disabilities and participation problems?

Investigation of health problems in terms of their cause, natural course and prognosis

- What is the natural course in terms of severity and nature (i.e. impairments, disabilities or participation problems)?
- Does the patient have a history of hip or knee complaints?
- When did the complaints start, what is the course over time in terms of complaints and functioning?
- Are complaints episodic, long-lasting, recurrent or chronic (i.e., longer than three months' duration)?
- Prognostic factors:

Causal factors:

- How did the complaint start?
- Is there a birth disorder that affects the hip or knee?
- Are there any hereditary (genetic) factors that could influence osteoarthritis?
- Is there a history of trauma that could have caused joint damage in the hip or knee? If so, how long ago and how well did the patient recover?
- Is the patient overweight?
- Does the patient take part in heavy labor or in a sport that strains the hip or knee?
- If there is joint damage or rapid disease progression: Is there a history of other joint disorders affecting the hip or knee (e.g., trauma involving damage to the meniscus, a meniscus operation, or rheumatoid arthritis)?

Positive and negative influences:

- What does the patient do for himself to improve his condition?
- Does the patient have the feeling that this helps?
- Does the patient have an active lifestyle? Does the patient rest if pain occurs?
- What amount of movement does the patient would damage the joint? Is he afraid to move or afraid of falling?
- Is the patient motivated to exercise?
- Are there any co-morbid complaints?

- Do factors in the patient's environment (e.g., the patient's partner or the work situation) have a positive or negative influence on the patient's condition?
- Diagnosis, treatment and the results of treatment:
 - What is the diagnosis (if known)?
 - Which instructions has the patient followed, in terms of resting and exercising or keeping warm or cool, and have they helped?
 - Has the patient had any previous treatment? What type of treatment was it and what were the results?

Investigation of the present situation

- The severity and nature of any impairments, disabilities or participation problems that are related to osteoarthritis:
 - Is there pain when the patient carries a load at the present time? Where is the pain located and how long does it last? Is there pain while resting or during the night?
 - Is there swelling of the knee? Is it local? Is it on the left or right?
 - Is the knee warm?
 - Does the patient have morning stiffness or starting pain?
 - Are some movements of the hip or knee limited? If so, in which directions?
 - Are there situations that reduce or increase the pain (e.g., resting, standing, moving, getting out of a chair, climbing stairs or taking part in sport)?
 - How much can the patient use the hip or knee during ADL, at work and in sporting activities?
 - Which disabilities affect normal daily life activities? How does the patient perceive these disabilities?
 - Does the patient complain about problems in other joints?
- What is the patient's present general health situation, including his functioning, activities and participation?
- Present treatment, including details of the medicines received and their dosage:
 - Does the patient use anti-inflammatory drugs or painkillers (e.g. non-steroidal anti-inflammatory drugs or Tylenol)? If so, for how long have they been used?
 - Has the patient had any injections in the joints (e.g. of corticosteroids)? If so, when and how often?
 - Is the patient seeing a medical specialist?
 - Is the patient receiving treatment from an occupational therapist, podiatrist, nutritionist or other therapist?
- What level of information does the patient need?
- What are the patient's expectations?
- Which activity-related goals does the patient hope to achieve?

evaluated. A questionnaire, the Patient-Specific Complaint questionnaire,⁶⁹ can be used to assess the patient's most important complaints. The questionnaire provides an assessment of the patient's functional status. In it, the patient selects between three and five of the most important factors affecting his physical activities. The questionnaire can also be used by patients with rheumatism and other complaints. It provides good responses in patients with back problems, but not enough is known about its reliability.

VAS (Visual Analogue Scale)

The patient evaluates the pain occurring in the previous week on a visual analogue scale, measuring 0–100 mm. The scale is mainly used for assessing pain intensity but it can also be used for other pain dimensions, such as the emotional impact of pain [i.e., pain affect⁷⁰] and the patient's pain tolerance.^{71,72} It is a valid, reliable and responsive pain measurement instrument for use in daily practice and it can be completed quickly.^{73,74} It is easy to construct and to score, and is readily

understood by people from a wide range of different cultures. It can be used frequently and repeatedly and requires no specific training. One drawback of the VAS is that patients must be able to understand that a line can represent an abstract concept like pain.⁷⁵⁻⁷⁷

Algofunctional Index

The Algofunctional Index has been specially developed and validated for patients with osteoarthritis of the hip or knee. It provides measures of pain, maximum walking distance and the patient's level of activity in daily life. It takes 3- 4 minutes to fill in. The method enables patients' progress to be followed over time in parallel with their general perception of improvement, as determined by the patients themselves. It is a valid instrument with

good reproducibility and responsiveness.⁷⁸⁻⁸⁰ The total score on the Algofunctional Index represents the patient's degree of limitation in ADL:) : > 14: extremely severe disabilities; 11-13: very severe disabilities; 8-10: severe disabilities; 5-7: moderate disabilities; 1-4: minimal disabilities. A total score greater than 11 or 12 can indicate that an operation may be necessary and provides sufficient reason for contacting the referring physician.

Assessment

Assessment comprises inspection, palpation and functional assessment. Inspection involves observing the patient, with most attention being given to the back, pelvis, hips, knees and feet. The assessment provides a record of the patient's situation at that

Table 5. Details of the assessment process in patients with osteoarthritis of the hip or knee.

Inspection

- Where is the pain located?
- Where is the swelling located? Is there, at present, mild, moderate or severe swelling? Is the swelling local?
- Are there any structural changes?
- Are there any postural changes involving the knee, hips, pelvis or spine?
- Are there any postural changes in the lower leg that affect the thigh (e.g., genu varum or genu valgum)? Are there any postural changes in the foot? Are there any postural changes in one leg relative to the other?
- Does the circumference of one leg differ from that of the other?

Palpation

- Is there any swelling?
- Is there an increase in joint temperature?
- Is there synovial expansion? Is palpation painful?
- What is the muscle strength of the lumbar extensors and hip adductors (for osteoarthritis of the hip)?

Functional assessment

- How much strain can the patient put on the hip or knee while, for example, standing, standing on one leg, or walking?
- During active assessment, patients are asked about their ability to perform flexion, extension and rotation of the knee, and flexion, extension, abduction, adduction, external rotation and internal rotation of the hip.
- Passive assessment gives an indication of the total range of motion, of sensation at the end of joints, and how pain is provoked.
- What is the muscle strength and tone (e.g., of the quadriceps and gluteus), and the stability and flexibility of both legs?
- How is balance on both legs during walking?
- How well are any orthopedic aids used?

moment in time. It must be seen in the context of daily activities. It is important that evaluations of osteoarthritis are repeated regularly so that there are enough time-points to assess progress (see the section on evaluation below) when the disease has a very variable natural course. Table 5 provides more details of the assessment process in patients with osteoarthritis of the hip or knee. If, during assessment, other symptoms are found that are not characteristic of osteoarthritis, for example long-lasting intense pain, the physical therapist should contact the referring primary care physician.

Diagnosis according to Cyriax's tests

A capsular pattern in a joint is an indication of arthritis or arthrosis. The guidelines do not recommend using the results of Cyriax's tests in osteoarthritis of the hip or knee.⁸¹ This is because the significance of finding a capsular pattern in a hip or knee joint is still under discussion.^{82,83}

During functional assessment, a hand-held dynamometer can be used to measure muscle strength and a goniometer to measure movement. The hand-held dynamometer must be used in accordance with a standard method.

Analysis

The patient's condition is analyzed on the basis of the information provided by the referral and collected during the first physical therapy visit, history taking and assessment, as described above. It is then described in terms of impairments, disabilities and participation problems. Examples are: pain complaints, morning stiffness, decreased muscle strength, walking limitations, difficulty in putting shoes on, fear of movement, and being unable to work. The end result is to reach a decision about the patient's central problem areas, which characteristic patient profile fits best, and how physical therapy can help. A number of factors have negative influences on the condition: obesity, an inadequate way of coping, and co-morbid complaints. On occasion, these factors may make it necessary to discuss the situation with the referring physician during treatment or to involve another type of healthcare worker in the treatment plan, for example, a nutritionist, podiatrist, occupational therapist or

medical specialist. Factors that have a positive influence include an adequate way of coping and a supportive environment. The physical therapist makes a prognosis, and decides whether the patient is sufficiently motivated to participate in physical therapy, whether there is an indication for such therapy, and whether the patient can be treated according to the guidelines. If there is no indication for physical therapy, the patient is sent back to the referring physician with, if necessary, advice that a referral should be made to a medical specialist. After discussing the analysis with the patient, a treatment plan is formulated.

Treatment plan

The goals of physical therapy can be formulated once the nature of the factors influencing the health problem are known. Only then, can goals be formulated in terms of removing, reducing and preventing impairments, disabilities and participation problems. In other words, formulated in terms of improving the patient's functioning, levels of activity and participation. The treatment plan provides a structure for the treatment process, and enables it to be controlled and evaluated. In addition, the treatment plan determines individual treatment goals, the conduct of therapy, treatment strategies, and the tasks to be carried out by the patient and physical therapist. The treatment plan is primarily based on the results of the diagnostic process and the identified problem areas in the appropriate patient profile, as shown in Table 6.

Therapy

The central goal of physical therapy here is to counter the effect of osteoarthritis by decreasing the patient's pain, disabilities and participation problems. In other words, to optimize the patient's levels of activity and participation in life. The main areas treated by physical therapy are: disabilities, for example, in walking, bending over and sitting down; if necessary, participation problems such as taking part in household and occupational tasks; the causal impairments, such as muscle atrophy, decreased movement flexibility and decreased stamina; and inadequate coping strategy. Of central importance to the therapeutic process are: providing information

Table 6. Summary of the physical therapy process, showing treatment goals and actions based on identified problem areas within the three characteristic patient profiles.

Problem area	Treatment goals	Actions
1. Impairments related to active inflammatory processes	<ul style="list-style-type: none"> • Reduce pain, hydrops and impairments in movement • Gain insight into the relationship between the patient's joint load and load-bearing capacity 	<ul style="list-style-type: none"> • Provide information and advice on the relationship between load and load-bearing capacity • Provide exercise therapy within the limits set by joint capabilities • Instruct on the use of orthopedic aids • Provide cryotherapy (only for the knee) • Provide TENS (only for the knee)
2. Pain	<ul style="list-style-type: none"> • Reduce pain • Gain insight into the relationship between the patient's joint load and load-bearing capacity • Increase joint capabilities 	<ul style="list-style-type: none"> • Provide information and advice on the relationship between load and load-bearing capacity • Provide exercise therapy, including the use of active movements • Manipulate joints (traction) • If necessary, give instruction on orthopedic aids • Apply medial tape if there are patellofemoral complaints • Provide TENS (only for the knee)
3. Impairments related to movement (not including fear of movement)	<ul style="list-style-type: none"> • Increase muscle strength • Increase strength and active stability • Improve coordination • Increase mobility (both capsular and myogenic) 	<ul style="list-style-type: none"> • Provide information and advice on movement • Provide exercise therapy as load increases (in both duration and intensity), through quadriceps exercises, flexion and extension exercises, and walking exercises • Manipulate joints • Provide heat treatment in preparation for exercise therapy
4. Disabilities	<ul style="list-style-type: none"> • Reduce disabilities in bending, kneeling, squatting, walking, climbing stairs, washing and dressing, using the toilet, washing dishes, washing clothes, house-cleaning, and cooking 	<ul style="list-style-type: none"> • Provide information and advice on building up load relative to load-bearing capacity and in building up load intensity over time, while taking into account behavioral principles • Stimulate activities involving a

<p>5. Participation problems</p>	<ul style="list-style-type: none"> Optimize participation in housework, education, sport, professional work, hobbies, and recreational activities 	<ul style="list-style-type: none"> build-up in load (both duration and intensity) Provide orthopedic aids and information on their use Provide information and advice on participating in activities listed under goals Continue providing exercise therapy with regard to ADL, sport, hobbies and work while increasing load (both duration and intensity) Provide orthopedic aids and information on their use Meet with other practitioners treating the patient and with the patient's employer to discuss the situation
<p>6. Inadequate pain behavior</p>	<ul style="list-style-type: none"> Optimize an adequate way of coping 	<ul style="list-style-type: none"> Provide information and advice on methods of coping with pain, and emphasize the importance of continuing to exercise (if necessary, in a group) Provide exercise therapy while giving positive feedback and encouraging positive experiences Teach coping strategies (if necessary, in a group) Help the patient's environment to have a positive rather than negative influence

and advice; exercise therapy and encouraging a positive way of coping with the complaints. The adoption of a behavioral approach is important for treating patients who have an inadequate way of coping with the complaints. During the therapeutic process, the physical therapist will evaluate treatment goals systematically.

In patients fitting patient profile A, the role of the physical therapist is to decrease pain and the impairments related to active inflammatory processes. The recommended therapeutic approach is based on consensus. In patients fitting patient profile

B, the accent is on encouraging greater activity and better functioning. Monitoring the patient over time is a central part of the therapeutic process. The physical therapist guides the patient during his or her recovery of control in ADL, hobbies, sport and work. In patients fitting patient profile C, treatment is based on building up the level of ADL, hobbies, sport and work. One important aspect of treatment is that the patient should regain a sense of control. The patient will have to learn problem-solving techniques and the appropriate way of dealing with the complaints of osteoarthritis. If necessary, the physical therapist may contact the practitioners of any other

disciplines involved in treating the patient or the patient's employer.

There follow reviews of the various therapeutic practices and techniques that can be used for treating patients with osteoarthritis of the hip or knee, along with descriptions of any relevant consequences for the guidelines. The conclusions reached are based on the literature reviews and meta-analyses available, and on recently published RCTs.

Exercise therapy

A search for literature on the effectiveness of exercise therapy resulted in eight reviews^{59,84-90} and one overview study.¹⁵ The systematic review by van Baar⁸⁴ on the efficacy of exercise therapy provided the starting point for these guidelines. The review covered 11 randomized clinical trials. The following criteria were used during selection: therapy had to be randomized, and relevant outcome measures, such as the level of pain, reported disabilities, observed disabilities, and patients' testimony, had to have been used. The conclusions of the review were based on two research studies in which the methodical quality and statistical power were sufficiently high.^{42,91} These studies indicated that exercise therapy has a small positive effect on pain, small positive effects on observed and recorded levels of activity, and a medium to large positive effect on patients' perceptions. The effects of individual aspects of therapy, such as exercise therapy or encouraging active coping, are unclear. The results of implementing care interventions in osteoarthritis of the hip or knee that were recorded in the overview study by Schouten and van der Linden¹⁵ are included in earlier reviews by Marks⁸⁸, Dekker et al.⁵⁹ and Puett et al.⁸⁵ Schouten and van der Linden concluded that the authors of the various reviews were positive about the effects of exercise therapy, which may result in a 10–30% improvement in pain and disabilities.

Hydrotherapy

Two RCTs report that hydro-aerobic exercises carried out in combination with other forms of therapy have positive effects on osteoarthritis of the hip or knee.^{92,93} The review by Hoving et al.⁸⁶ concludes that hydrotherapy has a greater effect on the pain

caused by osteoarthritis of the hip than on other forms of pain. However, the evidence presented in this study is of limited value because the quality of the experimental method is poor.

Group therapy

A number of studies show that group therapy has positive effects.^{71,92–96,142} In the Netherlands, two group programs have been developed, entitled 'Hup met de heup' and 'Omgaan met artrose'. 'Hup met de heup' is an exercise program for people with osteoarthritis of the hip. It results in decreased pain, which improves the patient's quality of life.⁹⁶ 'Omgaan met artrose' is an age-dependant program for persons with osteoarthritis of the knee. It helps them develop an effective way of dealing with osteoarthritis.⁷¹

Optimal type of exercise program

There is insufficient evidence to draw conclusions about the optimal type of exercise therapy. Individual therapy, group therapy, and hydro-aerobic exercises in combination with other forms of therapy, such as psychoeducational interventions, all have positive effects on osteoarthritis of the hip or knee. Exercises that involve loading, that are functional, that focus on strengthening muscles (e.g., the musculus quadriceps femoris), and that improve stamina all seem to have positive effects.

Patient subgroups

At present, little is known about which subgroup of patients would benefit most from exercise therapy.^{35,59,84}

Consequences for guidelines

During the active phase of treatment in patients fitting patient profile A, the guidelines recommend exercise therapy at a level such that the load is within the joint's load-bearing capacity. This advice is based on practical experience and was also agreed by consensus. It is important that it is followed so that active inflammatory processes do not increase. Bunning and Materson⁹⁷ recommend that medication should also be used in the active phase and that exercise therapy should start at a low load, which can be slowly increased later. When inflammatory processes ameliorate, therapy should

concentrate on pain reduction and exercise therapy should be adjusted according to the symptoms produced by the strain involved. Therapy in patients fitting patient profile B is based on encouraging better functioning and increasing ADL, while building up exercise intensity and duration. In those fitting patient profile C, there should be a further increase in activities associated with daily life, sport, hobbies and work, while exercise intensity and duration is increased. Moreover, behavioral techniques should also be employed. Similarly, if changes in exercise behavior are needed in patients fitting patient profile A or B, it is recommended that behavioral principles should be followed. These guidelines do not prescribe a specific approach to providing exercise therapy.

Behavioral principles

Behavioral principles can be used in patients who have an inadequate way of coping with the complaints of osteoarthritis. Here, the main focus is not on the underlying pathology (impairment) but on the inappropriate behavior and on the situations in which this behavior occurs.⁶¹ Other aspects of treatment are the patient's level of active participation and a time-contingent approach (time determines the therapeutic interventions). In behavioral treatment, three main approaches are distinguished: the operant approach in which the main focus is on pain behavior; the respondent approach in which the central focus is on recognizing and reducing stress; and the cognitive approach in which the focus is on influencing the perception and expectation of pain.⁶¹ For the physical therapist, the operant approach is recommended. With pain behavior of central concern, the operant approach focuses on increasing healthy behavior, such as walking, cycling and working, and on decreasing pain-related behavior, such as the overuse of orthopedic aids and movement inhibition. In this way, the influence of the environment is brought under control. The use of 'graded activity' also helps achieve the targets of increasing the patient's level of activity and decreasing his or her pain-related behavior. Morley et al. conducted a systematic review and a meta-analysis of the effectiveness of applying behavior principles in adults with chronic pain.⁹⁸ The use of behavioral principles proved to have a positive influence on the patient's pain perception, mood,

social functioning and pain behavior.

Providing information and advice

The main goals of informing and advising patients are:

1. to provide knowledge about osteoarthritis and its therapy;
2. to influence compliance with therapy; and
3. to promote an appropriate way of coping with the complaints, including any associated impairments, disabilities and participation problems.

1. Providing knowledge about osteoarthritis and its therapy

Patients with osteoarthritis need information and support. Their main problems are pain, tiredness, uncertainty about the future, depression, lifestyle changes, and adjusting to the disorder.³⁵ According to Dutch research, persons suffering from osteoarthritis of the hip or knee know little about the disorder.⁹⁹ In this study, approximately half of all elderly patients reported that they knew that controlled moderate exercise is not harmful. Only a quarter reported that they knew that associations for patients with rheumatism are also for osteoarthritis patients and that having osteoarthritis does not necessarily lead to being confined to a wheelchair.

2. Influencing compliance

In addition to providing exercise therapy, the physical therapist must also try to ensure patient compliance, or in other words, to encourage the patient's desire to participate in therapy.^{35,41,85,100,101} Compliance is often very low at the end of therapy.¹⁰² Two of the most important factors leading to non-compliance are, firstly, obstacles encountered by patients – for example, exercise therapy may not fit into their daily routine or may not be appropriate to their situation – and, secondly, an absence of positive feedback in their normal environment. To overcome these obstacles, it is important that the exercises and advice given are adjusted to each patient's individual situation and that any problems the patient experiences with the exercises or with behavioral changes are dealt with regularly. In addition, the physical therapist should regularly give positive feedback.¹⁰²

Knibbe and Wams¹⁰³ described a systematic way of increasing the patient's compliance to therapy. A distinction is made between short-term and long-term therapy. Influencing compliance over the long term involves changing how the patient evaluates the advantages and disadvantages of therapy and increasing the patient's feeling of personal efficacy. Changing how the patient evaluates the advantages and disadvantages of therapy depends on influencing the patient's reasoning. Increasing the personal efficacy involves actively giving the patient the feeling that he is able to control the situation and the associated behavior.

3. Promoting an appropriate way of coping complaints with the condition, including impairments, disabilities and participation problems

Two important aspects of successful therapy are decreasing the strategy 'resting' if there are complaints and increasing the patient's activity level in normal daily life. Both aim to decrease physical disabilities.⁵⁴ A meta-analysis of the effectiveness of instilling cognitive coping strategies showed positive results. Of the 51 studies analyzed, 85% reported improvements in measures such as pain tolerance, pain intensity and pain threshold.¹⁰⁴ Changing a passive coping style into an active coping style seems to make a significant difference. It is important that exercise therapy starts with a controlled loading force that is beneficial for and not damaging to the joint.

Recent literature indicates that adopting a psychoeducational approach is important in patients suffering from osteoarthritis of the hip or knee. There are two forms of psychoeducational intervention:¹⁴

1. Self-help programs. Information and support is given while the patient learns and engages in new activities such as exercising, relaxing and carrying out 'energy saving' actions. The patient learns and practices new skills, such as being assertive with health professionals and family members, managing time, and solving problems. Self efficacy is also important and interactions with fellow sufferers can be helpful.
2. Cognitive-behavior therapy. This intervention comprises teaching about pain theory, teaching new skills, such as relaxation and cognitive

techniques, and encouraging the integration of new knowledge and skills into daily life.

The main goal of psychoeducational interventions is to decrease the patient's complaints, such as pain, disabilities and depression. In a review of the effectiveness of psychoeducational interventions in patients with osteoarthritis, Lorig¹⁰⁵ concluded that effectiveness is greater when the interventions 'include or emphasize endurance exercise, coping, self-efficacy and problem solving' than it is in interventions in which the emphasis is on movement flexibility or 'joint protection'.³⁵

Schouten and van der Linden³⁵ carried out an overview study of the effects of psychoeducational interventions in patients with osteoarthritis. The overview included two meta-analyses,^{106,107} two systematic reviews^{105,108} and a meta-analysis of psychosocial interventions in chronic disease.¹⁰⁹ In general, all the reviews and meta-analyses showed that psychoeducational interventions had positive effects, especially on pain and depression. Their efficacy in decreasing functional limitations is unclear, but there is possibly a small effect. There was a 10-20% greater decrease in pain than in the control group and a 15-20% greater decrease in depression.¹⁰⁶ The group of patients that experienced the greatest effect was not accurately defined. Schouten and van der Linden recommend that the Kovar et al. study⁹² should also be taken into account in planning treatment. In this latter study, the therapeutic program included exercise therapy (i.e., a walking program), a focus on self-efficacy, and an informational approach based on behavioral psychology.

Van Baar¹¹⁰ also concluded that an optimal approach to exercise therapy should involve psychoeducational interventions. Patients learn how they can plan their day on the basis of their symptoms and they are provided with techniques that enable them to handle a range of different situations and to make individual decisions on the basis of their needs. The patients' ability to manage themselves is increased if they can make realistic and attainable goals and if they receive feedback. The information provided must be matched to the individual's specific situation.

Consequences for guidelines

One of the general therapeutic targets in patients fitting any of the three characteristic patient profiles is providing some insight into the disorder and its treatment. Physical therapists should provide patients with information about osteoarthritis and its treatment as well as giving advice that can be applied at home. One example is to advise patients to lie on their stomachs for 20 minutes a day or to use cushions under the knees to prevent the development of contractures. For patients fitting patient profile A, information is given on the balance between load and load-bearing capacity, whereas those fitting patient profile B receive information about building up load and load-bearing capacity and about how load can be built up over time. Patients fitting patient profile C are given information on how to take part in, for example, household and occupational activities. In these patients, the information and advice given by the physical therapist should promote compliance, decrease the level of fear and encourage an appropriate form of coping. Patients fitting patient profiles A and B who have inadequate pain behavior should receive similar information and advice. The physical therapist should avoid ambiguity by making careful use of the information obtained from the patient. For example, attempting to reassure some patients can be counterproductive. The best way to reassure is to encourage the patient to become active and take part in some form of exercise, thereby enabling him or her to receive positive feedback by realizing how beneficial exercise is. It is also important to pay attention to the patient's environment and to provide the patient's partner or employer with essential information and advice. A self-help program is described in the Dutch book entitled: 'De Pijn de Baas'.¹¹¹

Modalities

The effects of electrotherapy, ultrasound therapy, laser therapy and short-wave therapy are unclear. The Dutch Healthcare Board's report¹¹² on 'the effectiveness of physical agents', such as electrotherapy, laser therapy and ultrasound therapy, concludes that the use of physical agents in physical therapy, whether alone or in combination with exercise therapy, does not increase the value of therapy. Transcutaneous electrical nerve stimulation

(TENS) is the only form of low-frequency electrotherapy that seems to have a positive effect as it can reduce pain in the knee in patients with osteoarthritis of the knee. Its clinical relevance is speculative because the effects are limited.¹¹²

The conclusions reached by the Dutch Healthcare Board are based on a number of reviews.¹¹³⁻¹¹⁵ The review carried out by Heijden et al.¹¹³ covers 11 studies on electrotherapy in patients with osteoarthritis. These include continuous direct current (e.g., half-wave alternating current and interrupted direct current) and sinusoidal alternating current (e.g., TENS and interferential therapy). These studies did not provide sufficient evidence that electrotherapy has any effect on reducing pain, reducing symptoms, or improving functioning in patients with osteoarthritis of the hip or knee. The only positive effect found was with TENS, which reduced pain in the knee.¹¹⁶⁻¹¹⁸ Because the effects reported are not highly significant, the use of electrotherapy, whether alone or in addition to exercise therapy or other forms of therapy, is discouraged. Puett et al.⁸⁵ and Marks⁸⁸ also concluded in their reviews that there is insufficient evidence that electrotherapy has a positive effect in osteoarthritis of the hip or knee. The systematic review carried out by van der Windt et al.¹¹⁴ looked at the effectiveness of ultrasound therapy in physical disorders, including osteoarthritis of the hip or knee. The researchers concluded that the methodical quality of the studies found was insufficiently high and that results were inconsistent. Therefore, adequate evidence is lacking. Their conclusion is in agreement with that of Nyholm Gam et al.¹¹⁹, who carried out a meta-analysis of the effects of ultrasound therapy on joint and muscle disorders. The use of laser therapy in physical disorders is covered by a review carried out by de Bie et al.¹¹⁵ This review included five studies on the effectiveness of laser therapy in osteoarthritis. One of the five studies showed positive effects. However, further research is necessary to provide more data on laser therapy in osteoarthritis.¹¹² An earlier systematic search of the literature found some reports¹²⁰⁻¹²² but provided no additional insights. Marks et al.¹²³ concluded, on the basis of 11 studies into the effect of continuous or pulsed short-wave therapy in osteoarthritis of the hip or knee, that more research is still needed.

Consequences for guidelines

In these guidelines only in patients suffering osteoarthritis of the knee and fitting patient profile A TENS could be a means to reduce the pain.

Cryotherapy and thermotherapy

According to the conclusions of an overview study carried out by Mens,¹²⁴ the use of cold packs in arthritis seems to delay inflammatory processes in the acute period, usually in the first 48 hours. However, no positive effects were found in a group of chronic patients. Research conducted by Oosterveld and Rasker¹²⁵ that involved the application of cold packs and hot packs in a group of 42 healthy volunteers concluded that the use of cold packs led to temperature reductions in both the body surface and in joints. If physical therapy primarily aims to decrease pain and stiffness, short treatment by cryotherapy is recommended. Treatment using cold air in combination with exercise therapy appears to have a greater effect than treatment with ice.¹²⁶ Thermotherapy is only recommended when there is little inflammation. The application of warmth can result in more joint flexibility and, therefore, can make exercise therapy easier and less painful.¹²⁷ Van Wingerden warned that slowing down inflammatory processes by cryotherapy can lead to problems with natural healing and can result in increased inflammation after the cold pack has been removed.¹²⁸ Although it is not possible to draw any evidence-based conclusions on the use of cryotherapy, literature reports do indicate that applying cold packs seems to be important for reducing pain during the acute phase.

Consequences for guidelines

Short cryotherapy should only be considered as a treatment option in patients fitting patient profile A who have osteoarthritis of the knee in a severe inflammatory phase.

Providing orthopedic aids

Little research has been conducted into the use of orthopedic aids by patients with osteoarthritis of the hip or knee. Use of a cane in the contralateral hand can reduce the load on the joint and is associated with less pain and an improvement of functions.^{129,130} Other possibly useful orthopedic aids

include: inlays to correct biomechanics in postural defects of the knees^{131,132}; or differences in leg length; light-weight knee braces, especially in patients with osteoarthritis and lateral knee instability;¹³³ and although RCTs on this topic are not available: shock-absorbent shoes for patients with osteoarthritis of the hip or knee.¹³⁴

Consequences for guidelines

In patients fitting patient profile A, the use of a cane can help lower the loading force on hip or knee joints, thereby reducing pain. In patients fitting patient profiles B and C, the use of a cane can increase self-confidence and improve walking (gait pattern). The physical therapist is responsible for identifying other orthopedic aids that may be useful and for recommending the use of simple aids in and around the house, for example, a bath chair or additional supportive rails. The physical therapist should discuss the use of these aids with the primary care physician and the practitioners of any other disciplines involved.

Joint manipulation

Hoving et al.⁸⁶ carried out a systematic review of physical therapy in hip complaints. One of the studies included in the review compared the effects of intermittent mechanical traction to placebo hip traction. The methodical quality of the study was low, however, and there was insufficient evidence on the effectiveness of hip traction. Recently, a RCT looked at the effect of manual therapy in combination with exercise therapy¹³⁵ Eighty-three patients with osteoarthritis of the knee were divided into two groups. The intervention used was manual therapy of the knee and, if needed, of the spine, hip and ankle combined with a standard exercise program. The control group were given placebo ultrasound treatment to the knee. The authors concluded that combining manual therapy with an exercise program has positive effects on pain, functioning, stiffness and walking distance. Moreover, there was a reduction in the number of indications for operations. No other studies on the effectiveness of manual therapy have been found.

Consequences for guidelines

There is little evidence for the therapeutic effects of

joint manipulation. The working group consensus was that joint manipulation should be included in the guidelines. For details of treatment, readers are referred to the Dutch handbook: 'Extremiteiten'.¹³⁶

Patient education plan

The patient education plan forms part the overall treatment plan. Formulating the education plan starts with an analysis of the patient's need for information, which was identified during history taking. The physical therapist should consider questions such as: What does the patient know about the disorder and its treatment? How is the patient coping? Does the patient know how to influence the complaints? What do the patient and the patient's partner expect from treatment?

Dekkers¹³⁷ divided the process of patient education into four tasks: informing, instructing, educating and guiding. These four tasks can defined hierarchically:

- Informing: providing the patient with facts about the disorder, its treatment and patient care.
- Instructing: providing concrete guidelines that the patient must follow in order to influence the treatment process.
- Educating: providing detailed explanations of the disorder and its treatment from which the patient learns about the background to the disorder and its consequences and from which the patient can learn what to do on their own to keep the disorder under control. Any independent skills acquired by the patient should be practiced, if necessary.
- Guiding: providing emotional support so that the disorder and its consequences can be accepted and emotionally processed by the patient.

In practice, these four tasks will often overlap. However, it is important that the tasks are kept separate during patient education if specific goals are to be met. In addition, there are practical differences between the four tasks, in terms of the time, educational aids and skills needed. Educating patients requires a higher level of didactic skills and more educational aids than simply informing patients. If there are indications that the patient does not accept the consequences of his or her disorder, then guidance becomes very important. In these

situations, it is recommended that the referring physician is consulted.

Steps in the patient education process

Van der Burgt and Verhulst¹³⁸ carried out an overview of all the education models used in healthcare and translate these into a model of patient education that could be applied in paramedical practice. They integrated the Attitude, Social Influence and Personal Efficacy determinant model¹³⁹ with Hoenen et al.'s Information Ladder Model.¹⁴⁰ The Attitude, Social Influence and Personal Efficacy determinant model is based upon the assumption that willingness to change behavior is determined by the relationship between the patient's Attitude (how the individual perceives behavioral change), Social influences (how others see behavioral change) and the patient's Personal efficacy (whether the patient thinks it will work or not). The Information Ladder Model proposed by Hoenen et al. visualizes a number of distinct phases: 'being open', 'understanding', 'wanting' and 'doing'. With a view to application in paramedical practice, van der Burgt and Verhulst added two extra phases: 'being able', and 'keep doing'. Another phase, designated 'the person', was added, in which the patient's individual characteristics were identified. Van der Burgt and Verhulst regard patient education as a process in which the last phase is behavioral change. This last phase can only be reached if the other phases are completed first. For details, see Table 7.

It is important to take into account the patient's character and abilities during the patient education process, including such personal factors as:

7. the locus of control, i.e., how much influence the patient believes he or she has over the situation;
8. attribution, i.e., the factors that the patient believes are influencing his or her life situation;
9. coping style, i.e., how the patient reacts to important incidents in his or her life; and
10. emotional state: the patient may be in an emotional state that does not permit him or her to be open to new information at that time. The patient's emotional states may also determine the way he or she reacts to the situation.

Attention must be paid to the patient's concerns

Table 7. The six steps in the process of patient education (source: van der Burgt and Verhulst.(138)

1. Being open

The physical therapist adapts the educational methods to the patient's perceptions, expectations, questions and concerns. Important questions are: What are the patient's main concerns? Which problems hamper the patient's ability to be open to new information and behavioral change?

2. Understanding

Information must be presented in such a way that the patient will understand and remember it. It is important not to provide too much information at one time. It is necessary to decide what information is needed first and what can be saved until later. The message should be repeated, in another form if necessary, and explained with the help of educational aids, such as pamphlets and videos. The physical therapist determines whether the patient has understood the information given.

3. Wanting

The physical therapist determines what motivates the patient to take action. Here, it is of value to understand how important performing the exercises is to the patient, to find out whether the patient feels supported or discouraged by people in his or her environment, and to determine whether the patient feels that he or she has an influence on the situation. The physical therapist will offer support and provide information about alternatives. Achievable goals are set.

4. Being able

The patient must be able to perform the prescribed behavior. Functional skills must be practiced. It is important to investigate the practical problems the patient anticipates and to decide how to overcome them.

5. Doing

The new behavior is practiced. The physical therapist makes clear, concrete and attainable agreements and sets concrete goals. If possible, positive feedback is given.

6. Keep doing

The patient must continue the learned behavior after treatment has ended. During therapy, the physical therapist discusses with the patient whether continuation of the learned behavior is possible. It is important to recognize the patient's potential, to identify what stimulates the patient, to see if any short-term or long-term goals can be achieved, and to find out what helps the patient to recover after a 'dip' in enthusiasm.

during every step of the educational process. The educational model described above can provide an insight into the problems a patient may have with compliance to therapy.

Treatment duration and frequency

The guidelines advise that the treatment of patients with osteoarthritis of the hip or knee should last for a minimum of six weeks. According to van Baar⁵², the effects of exercise therapy are of short duration. It is

important that patients continue to exercise and to practice the mobility and flexibility they have achieved. Van Baar recommends that therapy should be less frequent during the final phase of treatment so that patients can receive guidance over a longer period of time. Another option is to follow up treatment with a number of appointments for check-ups, as advised in the English guidelines.⁹ This ensures that compliance is greater and, consequently, that exercise therapy has a positive effect.

Aftercare

Some examples of local exercise and self-help programs that have been specially developed for patients with osteoarthritis of the hip or knee in the Netherlands are: 'Hup met de heup'⁹⁶, 'Omgaan met artrose'⁷¹ and 'Bewegen for ouderen'. In addition, there are other activities, such as exercising in (preferably heated) water.

Legal significance of the guidelines

These guidelines are not statutory regulations. They provide knowledge and make recommendations based on the results of scientific research which healthcare workers must take fully into account if high-quality care is to be provided. Since the recommendations mainly refer to the average patient, healthcare workers must use their professional judgment to decide when to deviate from the guidelines if that is required in a particular patient's situation. Whenever there is a deviation from the recommendations in the guidelines, it must be justified and documented.^{3,4} Responsibility, therefore, resides with the individual physical therapist.

Revisions

These KNGF-guidelines are the first development in clinical questions pertaining to diagnostics, treatment and prevention for patients with health problems due to osteoarthritis of the hip or knee. Subsequent developments that could lead to improvements in the application of physical therapy in this group of patients may have an impact on the knowledge contained in these guidelines. The prescribed method for developing and implementing guidelines proposes that all guidelines should be revised at a maximum of three to five years after the original publication.^{3,4} This means that the KNGF, together with the working group, will decide whether these guidelines are still accurate by 2006 at the latest. If necessary, a new working group will be set up to revise the guidelines. These guidelines will no longer be valid if there are new developments that necessitate a revision. Before any revision is carried out, the recommended method of guideline development and implementation will also be updated on the basis of any new knowledge and to take into account any mutual cooperative agreements made between the different groups of guideline developers working in

the Netherlands. The details of any consensus reached by Evidence-Based Guidelines Meetings (i.e., the EBRO platform), which are organized under the auspices of the (Dutch) Collaborating Center for Quality Assurance in Healthcare (CBO), will also be taken into account in any updated version of the method of guideline development and implementation. The uniform and transparent methods for the determination of the amount of evidence and the derived recommendations for practice are important improvements.

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List of abbreviations and glossary

ADL	Activities of Daily Life	NPI	Dutch National Institute of Allied health Professions
ICIDH	International Classification of Impairments, Disabilities and Handicaps	RCT	Randomized controlled trial
KNGF	Royal Dutch Society for Physical Therapy	TENS	Transcutaneous electrical nerve stimulation
NHG	Dutch Society of Primary Care Physicians	VAS	Visual Analogue Scale

Activity	Execution of a task or action by an individual ¹²
Coping	Sum of the cognitive and behavioral means of dealing with internal and external expectations created by a stressor ⁵⁷
Dynamometer	Instrument for measuring muscle strength
Functions	Physiological functions of body systems (including psychological functions) ¹²
Goniometer	Instrument for measuring angles
Impairment	Problem with body function or structure, such as a significant deformation or loss ¹²
Disability	Difficulty in carrying out an activity ¹²
Load-bearing capacity	The magnitude of load an individual can handle
Load or loading force	The magnitude of the actual physical, mental or social demand placed on an individual
Locus of control	The location of the patient's sense of control over a situation ¹²
Participation	Involvement in a life situation
Participation problem	Problem an individual may experience with involvement in a life situation
Patient profile	All the prognostic characteristics of the patient, which are associated with the health problem and the course of recovery.

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