

# Guidelines for the diagnosis, investigation and management of osteoarthritis of the hip and knee

REPORT OF A JOINT WORKING GROUP OF THE BRITISH SOCIETY FOR RHEUMATOLOGY AND THE RESEARCH UNIT OF THE ROYAL COLLEGE OF PHYSICIANS

**ABSTRACT**—Osteoarthritis is a frequent medical problem. In general practice, musculoskeletal problems account for one in 10 of new consultations, 18% of them for osteoarthritis [1]. Many patients with osteoarthritis receive all the treatment they need from their general practitioner. Others require specialist rheumatological advice, and a few need joint replacement surgery. Guidelines for the care of this common problem as it affects the lower limbs will assist in the provision of the most appropriate care and help to identify areas where further research is necessary.

Osteoarthritis is best considered as one potential cause of 'joint failure'. Osteoarthritis may be classified first by the joint sites involved, second by the severity of the individual radiological features and third by the presence or absence of clinical features. Clinically, the picture includes use-related pain, night pain, difficulty in initiating movement, and crepitus and 'bony' swelling, together with reduced range of movement in a joint. Radiologically, there is loss of inter-bone distance, subchondral sclerosis and cysts, and marginal osteophytes. Pathologically, there is initial defibrillation and softening which lead to local loss of cartilage, increased formation of subchondral bone, marginal osteophytes with altered bone contour, and a variable inflammatory synovitis [2].

## Epidemiology and natural history

Studies conducted in the UK by the Royal College of General Practitioners in 1981/2 showed an annual incidence of symptomatic osteoarthritis of 50/1,000 in women and 29/1,000 in men over 75 years old [1]. These figures, based on consultation rates, may be an underestimate of the true incidence of symptomatic

osteoarthritis. A recent North American population-based incidence study of symptomatic osteoarthritis suggested incidence rates of 50/100,000 patient years for hip osteoarthritis presenting for medical consultation, and 200/100,000 patient years for knee disease [3]. Osteoarthritis is rare before the age of 40 years, but thereafter its frequency increases with age. It occurs most often in the distal interphalangeal joints, then in the knees, and is less common in the hips.

Relatively little is known of the natural history of osteoarthritis. The disease progresses slowly and the pattern of progression at hip and knee differs [4]. Many people have radiological changes without symptoms, and symptoms of pain show considerable fluctuations with time. Although some patients improve after a symptomatic period due to osteoarthritis, most either remain static or have progressive disease. In many patients knee osteoarthritis remains static over 10 years [5].

## Clinical assessment

Successful management centres on careful questioning and physical examination of the patient. Pain and physical disability are the principal clinical problems, and their causes and treatment usually require independent consideration. Periarticular pain syndromes are common in association with osteoarthritis, though they must be differentiated from it and from intra-articular and bone causes of pain. Anxiety, depression, or fibromyalgia may be more relevant to an individual's pain and disability at a particular point in time than synovitis or mechanical dysfunction. Symptoms and functional impairment vary with time, reflecting the dynamic nature of osteoarthritis and the complexity of pain perception.

Many elderly people have radiological changes of osteoarthritis; it is important to determine whether it is the cause of joint symptoms. Generalised arthropathies such as rheumatoid arthritis, psoriatic arthritis, and crystal arthritis should be considered (Table 1).

The main clinical assessments include: the presence of joint pain and tenderness; the presence of bony and

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soft tissue articular swelling; the distribution of joint involvement; the duration of morning stiffness; the presence of inactivity stiffness; and the presence of associated periarticular problems such as bursitis or tendinitis. Clinical signs which are more common in osteoarthritic joints than in other forms of arthritis include bony swelling and joint crepitus.

Functional assessments are important, but are not often used in routine clinical practice. Standardised assessments such as the Health Assessment Questionnaire (HAQ) [6] or the Arthritis Impact Measurement Scale (AIMS) [7] can be used in osteoarthritis. 'Designer' instruments for osteoarthritis include the hip and knee scales of Lequesne, and associated measures [8].

### Investigation

X-ray confirmation of the diagnosis of osteoarthritis is not always needed, especially in a general practice setting. X-rays should be taken if there is doubt about the diagnosis, if some other arthropathy is possible, or if joint replacement surgery is being considered. There is little advantage in using radiographs to determine the progress of osteoarthritis in routine clinical practice, but showing their radiographs to patients with osteoarthritis can help with patient education.

Other investigations, such as rheumatoid factor titres or assessments of the acute phase response by measuring the ESR, will usually be negative or normal in osteoarthritis, and are only indicated in cases where there is diagnostic uncertainty.

### Treatment

The goals of treatment are patient education, pain relief, and optimisation of function. A 'total patient' approach is appropriate. The treatment options are shown in Table 2.

#### *Patient education*

It is essential that patients understand the nature and likely effects of osteoarthritis, because this can help in their therapy [9]. They should be told about the disease itself and be reassured that it differs from rheumatoid arthritis. They should also be informed that it often stabilises and that surgery is usually not needed. General advice should include: explaining the

**Table 1.** Differential diagnosis of osteoarthritis

Rheumatoid arthritis
Crystal arthritis (gout and pyrophosphate crystal deposition disease)
Seronegative arthritis, eg psoriatic arthritis
Periarticular syndromes, eg bursitis and tendinitis

advantages of losing weight if obese (giving help, if needed); discussing footwear, stressing the importance of shock-absorbing insoles (found in 'trainers' and other shoes); and emphasising the importance of regular exercise, such as walking every day. Simple aids such as walking sticks should be encouraged.

#### *Physical and non-pharmacological treatments*

There are few prospective controlled evaluations of non-pharmacological therapies in osteoarthritis, though some, such as physiotherapy, are often used.

An exercise programme for patients with osteoarthritis of the knee and hip increases activity and improves walking time without worsening pain or exacerbating arthritis-related symptoms [10]. Pain lessens and muscle power is maintained. Other types of physiotherapy are frequently undertaken in patients with osteoarthritis. The simplest method of treatment involves teaching patients to perform quadriceps exercises, supervising them, and providing motivation [11,12]. Other methods of physiotherapy include the application of heat and cold, ultrasound, short-wave diathermy, and hydrotherapy, but they have not been subject to adequate critical appraisal to judge their benefits. The evidence that physiotherapy is of significant advantage for patients is weak, but it may help when combined with other procedures, such as arthroscopic lavage [13]; further studies are needed in this area. Hydrotherapy can be of value in rehabilitating patients disabled with osteoarthritis. It is often used to treat painful hips and to increase the range of movement of joints.

It is conventional to recommend rest for an acutely painful osteoarthritic joint, though there is little evidence to support this contention; Bunning and Materon [14] consider this advice to be an example of dogmatism in clinical practice. The case for repetitive exercise is more substantial. One study [10] has shown a 44% improvement in patients after three months of aerobic pool exercises. The balance of evidence is in

**Table 2.** Treatment options in osteoarthritis

Analgesics
Oral non-steroidal anti-inflammatory drugs
Local non-steroidal anti-inflammatory drugs
Local steroid injections
Weight reduction
Modification of mechanical factors (eg footwear, stick)
Exercise
Physiotherapy
Arthroscopy, washout and debridement
Replacement arthroplasty
Osteotomy

favour of exercise being beneficial in osteoarthritis, but further studies are needed to define the optimal approach [14]. Quadriceps exercises are of considerable benefit in decreasing pain and increasing function in osteoarthritis of the knee [15], and should be taught to patients.

Obesity is a well-established risk factor for osteoarthritis of the knee. It can predict the development of knee osteoarthritis 36 years later [16]. Weight change significantly affects the risk for the development of knee osteoarthritis; among obese women with a high risk of developing osteoarthritis, weight loss decreased the risk [17]. At present there is no information as to whether or not weight loss is effective after symptomatic osteoarthritis has developed, though it is reasonable to expect that it has an effect.

Various aids and appliances are provided for patients. A stick may reduce the load on a painful joint and improve both confidence and mobility [18]; insoles reduce the impact forces transmitted to painful joints and favourably influence joint mechanics [19]; simple aids for use within the home or garden, such as a bath stool, may substantially overcome handicap.

#### *Pharmacological treatments*

Drug therapy is an adjunct rather than a substitute for other treatments. Potential drug treatment includes analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), and local steroid injections; the concept of 'chondroprotection' by drugs remains controversial and is currently unproven [20].

Analgesics remain the first choice in drug therapy. The initial choice should be paracetamol, 0.5–1g given four to six hourly, up to a maximum of 4g/day. Nefopam hydrochloride, codeine phosphate, or combined preparations such as co-proxamol are often used, though evidence that they are better than paracetamol in osteoarthritis is scanty [21], and any increase in efficacy may be offset by greater toxicity [22]. However, patients often prefer a combined analgesic. Stronger opioids should not be used; uncontrolled pain requires re-evaluation or an alternative approach.

Non-steroidal anti-inflammatory drugs (NSAIDs) are widely used. Their superiority over simple analgesics is poorly documented. For example, a recent study showed no benefit over paracetamol for low (analgesic) or high (anti-inflammatory) doses of ibuprofen [23]. Although inflammation may be a feature of osteoarthritis, there is little evidence that NSAIDs are acting other than as analgesics. Nevertheless, for individual patients NSAIDs may offer better symptom control than pure analgesics.

NSAIDs are associated with significant morbidity and mortality [24]. Mortality from gastrointestinal complications (bleeding or ulceration of stomach, small bowel, and large bowel), cardiovascular side-effects such as fluid retention, renal side-effects such

as interstitial nephritis, and drug interactions, are particularly common and serious in elderly women, precisely the population with the highest requirement for control of osteoarthritic symptoms. NSAIDs should therefore only be considered when adequate doses of paracetamol have proved ineffective. When NSAIDs are used, it is advisable to prescribe the smallest effective dose, avoid repeat prescribing, and regularly reassess the need for NSAID therapy. This should be based on clinical assessment, vigilance for adverse reactions, and experience.

Monitoring for adverse effects, particularly in elderly women, has been advocated [25], though the value of such monitoring has not yet been assessed. Similarly, prophylaxis of stomach (and possibly small bowel) complications by 'gastroprotective' agents such as misoprostol is being increasingly discussed [26]. Such therapy does reduce endoscopic abnormalities but evidence that it reduces the rates of serious complications such as bleeding or perforation is still awaited [27].

Patients vary greatly in their response to NSAIDs, and there are no convincing data to favour some NSAIDs more than others for use in osteoarthritis. Major differences in the safety profiles of different NSAIDs have yet to be established.

Transcutaneous administration of NSAIDs may produce symptomatic relief equivalent to oral preparations [28]. Their use is limited to superficial joints such as the knee. There is no evidence for their effectiveness in hip osteoarthritis. It is still unclear whether they are more effective than rubefacients, though there are few clinical trial data on this issue.

Although certain NSAIDs show possible beneficial or detrimental effects on cartilage in experimental studies [29], evidence that NSAIDs affect the osteoarthritic process in man is still being sought. However, there is some evidence that indomethacin may have deleterious effects on hip damage [31]. This may be due to a number of mechanisms including damage to cartilage or bone. Until the results of further research are available indomethacin is best avoided in elderly osteoarthritic patients, especially as it is more often associated with other adverse effects, such as central nervous system toxicity and fluid retention, than are other NSAIDs.

The use of corticosteroids remains controversial. Intraarticular steroids often produce symptomatic relief, but this is transient and there is a significant 'placebo' response [32]. Different joints may show varying responses. Aspiration of synovial fluid with local steroid injection gives symptomatic benefits, and is mainly advantageous in allowing other therapies to be successfully instituted [33,34]. In spite of fears to the contrary, repeated injections do not appear to be harmful [35]. Other injectable compounds (eg glycosaminoglycan polysulphate, hyaluronate, and orgotein—a superoxide dismutase which inhibits free radical persistence) are still being assessed and are currently unlicensed in the UK.

### When to refer patients for specialist advice

Patients with osteoarthritis present to their general practitioner because of increasing pain, increasing disability, concern about the diagnosis, and the limitation of their activities. General practitioners should make the diagnosis, explain, educate, and advise, and initiate therapy. Referral for specialist advice may be necessary when there is a diagnostic uncertainty or there are persistent and poorly controlled symptoms. Increasing disability or a local complication such as locking of the knee are also reasons for referral. Most patients should be followed up in the community by their general practitioner. Patients need medical review of their osteoarthritis for advice on medication and physiotherapy; to look for complications such as bone collapse, avascular necrosis, instability of the joints, and acute crystal synovitis; and to minimise the risk of side-effects of medication by ensuring their early detection.

### When to consider surgery

Pain is the most important single reason for surgery. When pain becomes intolerable or unmanageable by medical means, operative treatment should be considered. Progressive loss of movement leading to deformity is a strong relative indication for surgery. When deformity exacerbates pain, for example in the varus osteoarthritic knee, correction of the deformity alone, in this example by osteotomy of the varus knee, may be indicated. The main reasons for surgery are given in Table 4.

Osteotomy and arthroplasty are the mainstays of surgical treatment. The choice of procedures and implants is outside the scope of these medical guidelines [36,37]. Surgical intervention must be weighed against patients' social circumstances and age; it must also take account of potential loss of employment. The general effects of surgery on health status should also be weighed in the balance [38,39]. Arthroscopic treatment with surface debridement, washout, and similar procedures is sometimes useful [40].

### Patients' needs and expectations

The first need is for adequate pain relief. The second need is for information and education. This will include explanations about why osteoarthritis has developed, its likely clinical course, the role of contributory factors such as obesity, and whether to rest or use the joints. Useful information in these areas is unfortunately limited.

When referral is needed for specialist rheumatological or surgical advice, this should be readily available. As well as specialist medical advice, a rheumatology unit may have nurses and paramedical staff with important roles in the management of patients with osteoarthritis. Direct access to physiotherapy and

**Table 3.** Reasons for specialist referral

Diagnostic uncertainty
Poorly controlled or uncontrolled symptoms
Increasing disability
Complications such as sudden locking of knee

**Table 4.** Reasons for surgery

Increasing, unmanageable pain
Progressive loss of movement or decreased range of movement
Increasing deformity
Complications such as sudden locking of knee
Progressive disability and dependency

other paramedical services by general practitioners is common, but uncertainty remains as to whether these approaches are effective, or may be wasted effort.

### The medical needs of people with osteoarthritis

The needs of patients with osteoarthritis are large (Table 5). A survey of self-reported disability in Great Britain by the Office of Population, Censuses and Surveys (OPCS) found that osteoarthritis involves 4% of adults up to 60 years of age, rising to 25% of 60-74 year-olds and 65% aged over 75 years [41]. Analysis of outpatient attendances in specialist rheumatology clinics in the UK showed that patients with osteoarthritis accounted for 10-45% of new referrals and 5-25% of follow-up patients [42,39]. In North America a survey

**Table 5.** Facilities and services needed by patients with osteoarthritis

Appropriately educated general practitioner confident in examination of locomotor system
Specialist rheumatological advice
Assessment of disability
Education and counselling
Physiotherapy
Advice on joint protection
Advice on shoes
Provision of aids and appliances
Dietary advice
Chiropractic
Drug therapy
Joint aspirations and injections
Social support: eg home help, meals on wheels
Orthopaedic surgery

of manpower requirements by the American College of Rheumatology [43] assumed a prevalence of 3,500 per 100,000 patient years and suggested that 60% of patients with osteoarthritis would require two specialist consultations. Applying these statistics to a UK district of 250,000 would mean 10,500 outpatient visits annually for osteoarthritis. This is a very heavy workload and would require either a substantial increase in the number of rheumatologists or a different approach to the management of the condition. The continued emphasis on the management of osteoarthritis within the primary care setting in the UK, and the contribution towards its management made by general practitioners, may explain the apparent divergence from North American practice.

Total hip arthroplasty for osteoarthritis is the most frequent major elective surgical procedure. Over 12 months in 1988/9 about 42,000 hips were replaced in NHS hospitals [44], 38% of them for osteoarthritis. In that year 36/100,000 were on the waiting list. The number of knee arthroplasties has increased to 15/100,000, 61% of them for osteoarthritis. In some

areas of the UK, especially London, the private sector makes a substantial contribution towards the number of hip and knee arthroplasties undertaken.

### Conclusions

Osteoarthritis is common and causes considerable persisting pain and disability. It is a frequent cause of consultations in general practice and referral for specialist rheumatological advice. It often necessitates replacement of major joints such as the hip and knee. Despite its frequency, the natural history of osteoarthritis and its overall progression are not well defined; nor are the relative advantages of different types of physical treatment and the persistent use of non-steroidal anti-inflammatory drugs fully evaluated. It is necessary to define the effects of current medical and surgical treatments and interventions on the course and outcome of osteoarthritis to establish an appropriate environment in which to provide optimal treatment and help for patients with osteoarthritis. Such endeavours will require fuller epidemiological studies with systematic measures of disease severity, as judged by pain experienced and functional capacity. Suggested measures for audit are given in Table 6.

**Table 6.** Suggested audit measures for lower limb osteoarthritis

#### Structure

1. Availability of consultant rheumatologists in local hospitals
2. Collaboration between GPs and hospital specialists
3. Availability of physiotherapy and occupational therapy services
4. Access to surgery and combined rheumatology and orthopaedic clinics

#### Process

1. Were appropriate clinical assessments made to establish the diagnosis and exclude other causes of joint pain?
2. Was a plain joint radiograph taken appropriately?
3. Did the patient receive adequate education and advice?
4. Were non-pharmacological treatments considered?
5. Were aids and appliances given when needed?
6. Was analgesia used when required or access available for other modalities of pain relief?
7. Were non-steroidal anti-inflammatory drugs used judiciously?
8. Was intra-articular steroid injection given when needed?
9. Was surgical referral considered when needed?
10. Was a follow-up plan made with good communication with general practitioners based on the need for most patients to be reviewed within the community?

#### Outcomes

1. Persistent articular pain
2. Progressive damage of major joints
3. Loss of social independence, increasing disability and loss of work (if relevant)
4. Serious drug reactions

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References

- 1 Morbidity statistics from general practice, 1981-82, Series MBS No. 1, London: HMSO, 1986.
- 2 MacSween, RNM Whaley K, (Eds). *Muir's textbook of pathology*, (13th edn) London; Edward Arnold; 1992.
- 3 Wilson MG, Michet CJ, Illstrup DM, Melton LJ. Idiopathic symptomatic osteoarthritis of the hip and knee; a population based incidence study. *Mayo Clin Proc* 1990;**65**:1214-21.
- 4 Cushnaghan J, Dieppe P. Study of 500 patients with limb joint osteoarthritis. Analysis by age, sex, and distribution of symptomatic joint sites. *Ann Rheum Dis* 1991;**50**:8-13.
- 5 Spector TD, Dacre JE, Harris PA, Huskisson EC. Radiological progression of osteoarthritis: an 11-year follow-up study of the knee. *Ann Rheum Dis* 1992;**51**:1107-10.
- 6 Fries JS, Spitz P, Kraines RG, Holman H. Measurement of patient outcome in arthritis. *Arthritis Rheum* 1980;**23**:137-45.
- 7 Hill J, Bird H, Lawton C, Wright V. AIMS: an Anglicised version to assess the outcome of British patients with rheumatoid arthritis. *Br J Rheumatol* 1990;**29**:193-6.
- 8 Lequesne MG, Samson M. Indices of severity in osteoarthritis for weight-bearing joints. *J Rheumatol* 1991;**18** (Suppl 27):16-8.
- 9 Rene J, Weinberger M, Mazzuca SA, et al. Reduction of joint pain in patients with knee osteoarthritis who have received monthly telephone calls from lay personnel. *Arthritis Rheum* 1992;**35**:511-5.
- 10 Minor MA, Hewett JE, Webel RR, et al. Efficacy of physical conditioning exercise in patients with rheumatoid arthritis and osteoarthritis. *Arthritis Rheum* 1989;**32**:1396-7.
- 11 McAlindon T, Dieppe PA. The medical management of osteoarthritis of the knee: an inflammatory issue? *Br J Rheumatol* 1990;**29**:471-3.
- 12 Kovar PA, Allegrante JP, MacKenzie CR, et al. Supervised fitness walking in patients with osteoarthritis of the knee. A randomised, controlled trial. *Ann Intern Med* 1992;**116**:529-34.
- 13 Livesley PJ, Doherty M, Needoff M, Moulton A. Arthroscopic lavage of osteoarthritic knees. *J Bone Joint Surg (B)* 1991;**73B**:922-6.
- 14 Bunning RD, Materson S. A rational programme of exercise for patients with osteoarthritis. *Sem Arth Rheum* 1991;**21** (Suppl 2):33-43.
- 15 Chamberlain MA, Care G, Harfield B. Physiotherapy in osteoarthritis of the knee. *Int Rehabil Med* 1982;**4**:101-6.
- 16 Felson DT, Anderson JJ, Naimark A, et al. Obesity and knee osteoarthritis: The Framingham Study. *Ann Intern Med* 1988;**109**:18-24.
- 17 Felson DT, Zhang Y, Anthony JM, et al. Weight loss reduces the risk for symptomatic knee osteoarthritis in women. The Framingham Study. *Ann Intern Med* 1992;**116**:535-9.
- 18 Hicks JE, Gerber LH. Rehabilitation in the management of patients with osteoarthritis. In: *Osteoarthritis, diagnosis and medical/surgical management*. (Ed Moskowitz, ED, et al.) Philadelphia: Saunders 1992, pp427-64.
- 19 Yasuda K, Sasaki T. The mechanisms of treatment of osteoarthritis of the knee with a wedged insole. *Clin Orthop* 1987;**215**:162-72.
- 20 Brooks PM, Ghosh P. Chondroprotection: myth or reality? *Clin Rheumatol* 1990;**4**:293-303.
- 21 Brooks PM, Dougan MA, Mugford S, Meffin E. Comparative effectiveness of five analgesics in patients with rheumatoid arthritis and osteoarthritis. *J Rheumatol* 1982;**9**:723-6.

- 22 Kjaersgaard-Anderson P, Nafei A, Skov O, et al. Codeine plus paracetamol versus paracetamol in longer-term treatment of chronic pain due to osteoarthritis of the hip. *Pain* 1990;**43**:309-18.
- 23 Bradley JD, Brandt KD, Katz BP, et al. Comparison of an anti-inflammatory dose of ibuprofen, an analgesic dose of ibuprofen, and acetaminophen in the treatment of patients with osteoarthritis of the knee. *N Engl J Med* 1991;**325**:87-91.
- 24 Girdwood RH, Petrie JC. *Textbook of medical treatment* (15th edn.) London and Edinburgh: Churchill Livingstone, 1987, p553.
- 25 Blackshear JL, Napier JS, Davidman M, Stillman MT. Renal complications of NSAIDs: identification and monitoring of those at risk. *Sem Arth Rheum* 1985;**14**:163-75.
- 26 Roth SH, Fries JF, Abadi IA, et al. Prophylaxis of non-steroidal anti-inflammatory drug gastropathy; a clinical opinion. *J Rheum* 1991;**18**:956-7.
- 27 Hopkinson N, Doherty M. NSAID-associated gastropathy—a role for misoprostol? *Br J Rheum* 1990;**29**:133-6.
- 28 Doogan P. Topical non-steroidal anti-inflammatory drugs. *Lancet* 1989;**ii**:1270-1.
- 29 Huskisson EC. Clinical aspects of chondroprotection. *Sem Arth Rheum* 1990;**19**:30-2.
- 30 Doherty M. Chondroprotection by non-steroidal anti-inflammatory drugs on the course of osteoarthritis. *Ann Rheum Dis* 1989;**48**:619-21.
- 31 Rashad S, Revell P, Hemmingway A, et al. Effect of non-steroidal anti-inflammatory drugs on the course of osteoarthritis. *Lancet* 1989;**ii**:519-22.
- 32 Friedman DM, Moore ME. The effect of intra-articular steroids in osteoarthritis: a double blind study. *Arthritis Rheum* 1978;**21**:556.
- 33 Dieppe PA. Are intra-articular steroid injections useful for the treatment of the osteoarthritic joint? *Br J Rheumatol* 1991;**30**:199.
- 34 Mazières B, Masquelier A-M, Capron M-H. A French controlled multicentre study of intra-articular corticosteroids in the treatment of knee osteoarthritis: a one-year follow-up. *J Rheumatol* 1991;**18** (Suppl 27): 134-7.
- 35 Keagy RD, Keim HA. Intra-articular steroid therapy: repeated use in patients with chronic arthritis. *Am J Med Sci* 1967;**253**:45-51.
- 36 Doyle D. Management of osteoarthritis. In: *Copeman's textbook of rheumatic diseases*. (Ed Scott JT, 6th edn). London & Edinburgh: Churchill Livingstone, 1986, vol 2, pp874-80.
- 37 Anonymous. Hip and knee joint replacements. *Drug and Therapeutics Bulletin* 1992;**30**:57-60.
- 38 Anonymous. How good are knee replacements? *Lancet* 1991;**338**:477-8.
- 39 Livesley PJ, Doherty M, Needoff M, Moulton A. Arthroscopic lavage of osteoarthritic knees. *J Bone Joint Surg* 1991;**73B**:922-7.
- 40 OPCS. Surveys of disability in Great Britain; the prevalence of disability among adults. Report 1. London: HMSO, 1988.
- 41 Bamji AN, Dieppe PA, Haslock DI, Shipley ME. What do rheumatologists do? A pilot audit study. *Br J Rheumatol* 1990;**29**:295-8.
- 42 Marder WD, Meenan RF, Felson DT, et al. The present and future adequacy of rheumatology manpower; a study of healthcare needs and physicians supply. *Arthritis Rheum* 1991;**34**:1209-17.
- 43 Healthcare Evaluation Unit. *Epidemiologically based needs assessment—total hip and knee joint replacements*. Bristol: The University of Bristol, 1990.

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