

3 > Osteoarthritis

KEY POINTS

- Osteoarthritis is the most common type of arthritis in Australia. Almost 1.4 million Australians are estimated to have this long-term condition.
- The disease affects the weight-bearing joints of hips, knees and ankles more often. The hands and spine area are also affected.
- More common among females than males, osteoarthritis rises in prevalence with age and increasing body weight.
- Effective treatment can control the pain and improve functioning and health-related quality of life of people with osteoarthritis.
- Osteoarthritis is the biggest reason for knee and hip replacement in Australia.

Osteoarthritis has been chosen for focused attention under the National Health Priority Areas (NHPA) Initiative for arthritis and musculoskeletal conditions due to its high impact on both the individual and society (NAMSCAG 2004). The disease, which mainly affects the weight-bearing joints of hips, knees and ankles, affects a large proportion of the population. Disability (in particular, mobility restriction), associated with osteoarthritis is high. It is possible to reduce this disability and pain with appropriate management.

This chapter describes the health impact of osteoarthritis in terms of:

- prevalence and incidence
- pain and disability, and
- use of health care services.

The nature of the problem and risk factors for the disease are also reviewed.

Nature of the problem

The process responsible for osteoarthritis begins in the cartilage and bone adjacent to the joint. Healthy cartilage allows bones to glide over one another; it also absorbs the shock of physical movement. If the cartilage begins to break down and wear away, normal biomechanics of the joint are disrupted. The bones around the cartilage start to rub together, causing pain, swelling and loss of motion (Felson et al. 2000).

The main symptoms of osteoarthritis are pain, stiffness and limitation of movement of the affected joint. There are no systemic symptoms or consequences, and most people with the condition are generally in good health. The symptoms vary from person to person. Inflammation of the joint occurs in several cases. Some people find the condition incapacitating while others live through it.

Osteoarthritis is usually a progressive disease, one that gets worse with time, often leading to functional impairment. Pain is initially felt in the joints during and after activity, but as the disease progresses it may occur with minimal movement or even during rest. Over time, the joint tends to lose its normal shape and become enlarged.

Risk factors and causal mechanisms

The causation of osteoarthritis bridges biomechanics (wear and tear) and biochemistry. A variety of risk factors and causal mechanisms contribute to the development and progression of the disease. In addition to predisposing factors such as age, sex and genetics, biomechanical factors such as obesity, body misalignment, meniscus tears and injury contribute to the underlying process, as do certain biochemical and immunological mechanisms. Major risk factors for osteoarthritis are listed in Box 3.1.

Box 3.1: Major risk factors for osteoarthritis**Predisposing factors**

- Genetic
- Sex
- Age

Biomechanical factors

- Obesity
- Misalignment
- Joint trauma and injury
- Repetitive occupational joint use
- Physical inactivity

Sources: March 1997; Scott & Hochberg 1998.

Ageing

Osteoarthritis may begin at any age, but usually affects older people. The average age of onset is about 45 years. Radiological and autopsy surveys show a steady rise in osteoarthritic changes in joints from age 30 onwards. By age 65, around 80% of the population have some radiographic evidence of osteoarthritis even though only one-quarter report any pain or disability (Nuki 1998). The possible age-related mechanisms are likely to be diminished capacity for cartilage repair, hormonal changes and the cumulative effects of environmental exposures (Peterson & Jacobssen 2002).

Sex

Females are at a higher risk of developing osteoarthritis than males, particularly after menopause. They are affected more frequently, more severely, and at more sites. The effects of sex hormones on cartilage may vary with menopausal status and stage of osteoarthritis. Many epidemiological studies suggest that hormone-replacement therapy (HRT) confers a protective effect against the development of knee and hip osteoarthritis (Nevitt & Felson 1996).

Genetics

Genetic factors account for up to 65% of variation in the osteoarthritis of hands and hips, and for a smaller percentage of osteoarthritis of the knees (Spector et al. 1996). Children of parents with early-onset osteoarthritis, or osteoarthritis involving more than one joint, are at increased risk of developing the condition (Loughlin 2002).

Excess weight

Osteoarthritis is associated with being overweight or obese, particularly among females. Both cross-sectional and prospective studies have found the link between osteoarthritis of weight-bearing joints and obesity (Felson & Zhang 1998; Cooper et al. 2000). The Framingham Study, for example, predicted knee osteoarthritis among obese people as early as three decades in advance of its onset (Felson et al. 1988). Excess body weight is also a predictor of hip osteoarthritis (Lievense et al. 2002).

Both local and systemic effects may, however, be relevant to a causal relationship between excess weight and osteoarthritis. Being overweight increases the load across a joint, thus increasing the stress on the cartilage that may, in turn, lead to osteoarthritis of weight-bearing joints. A force of nearly three to six times one's body weight is exerted across the knee while walking (Felson 1996). However, this mechanism does not explain the association between being overweight and hand osteoarthritis. Systemic factors, such as a cartilage growth factor may also accelerate cartilage breakdown in various joints (Felson 1996).

Cross-sectional data from the 2001 National Health Survey (NHS) show some association between self-reported weight and osteoarthritis in females (Table 3.1). A similar relationship is noted in terms of body mass index (BMI), which adjusts weight for a person's height. No such association is noted among males, however.

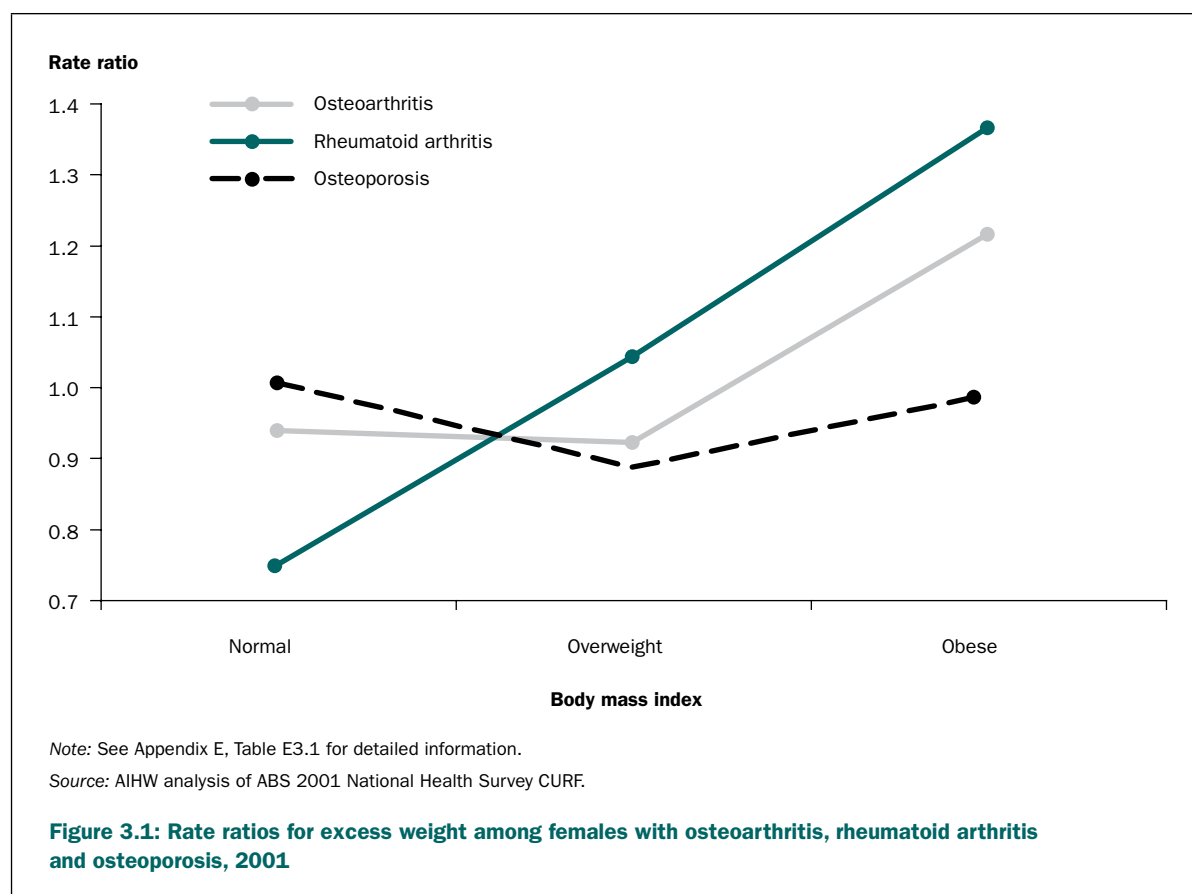
Table 3.1: Excess weight and osteoarthritis, ages 35 and over, 2001

Sex/ measure	Reported osteoarthritis	Total population
	Number per 1,000 population ^(a)	
Males		
<i>Self-reported weight</i>		
55–64 kg	67	63
65–74 kg	156	201
75–129 kg	731	675
<i>Body Mass Index</i>		
Normal	222	281
Overweight	446	449
Obese	307	252
Females		
<i>Self-reported weight</i>		
55–64 kg	251	275
65–74 kg	257	231
75–129 kg	309	246
<i>Body Mass Index</i>		
Normal	340	363
Overweight	264	287
Obese	349	288

(a) Rate per 1,000 population in that specific weight/ BMI category.

Source: AIHW analysis of ABS 2001 National Health Survey CURF.

Based on the 2001 NHS data, the rate ratios for osteoarthritis in Australian females for overweight and obesity were estimated to be 1.1 and 1.3, in comparison with the total Australian female population (Figure 3.1).



History of joint trauma or injury

Individuals with a history of joint trauma are more likely to develop knee and hip osteoarthritis (Wilder et al. 2002; Gelber et al. 2000). This includes joint trauma resulting from dislocation, contusion, fracture, tears of the menisci or ligaments, and surgical meniscectomy (Englund et al. 2003; Felson et al. 2000).

Repetitive use of joints

The repetitive use of joints is considered to be a risk factor for hip and knee osteoarthritis. Jobs involving kneeling, squatting, and climbing stairs are associated with higher rates of knee osteoarthritis, while jobs that require heavy lifting, including farming, are associated with higher rates of hip osteoarthritis (Schouten et al. 2002; Lau et al. 2000).

Other factors

Participation in sport has been associated with an increased risk of lower-limb osteoarthritis. Moderate recreational weight-bearing physical activity, however, does not appear to be a risk factor for knee osteoarthritis.

Osteoarthritis is also more likely to develop in people with a prior inflammatory joint disease such as gout or rheumatoid arthritis (McDuffie et al. 1987).

Prevalence and incidence

The proportion of people in the general population who experience osteoarthritis is a useful measure of its impact. For an intermittent episodic problem such as osteoarthritis, prevalence needs to be measured across a defined period of time. Regular national data, based on self-reports, are now available about its prevalence through the National Health Surveys conducted by the Australian Bureau of Statistics. However, no national data based on case definition by physical examination or radiological evidence are available.

The incidence of osteoarthritis can be modelled using the prevalence data and other epidemiological parameters (AIHW: Mathers & Penm 1999). There are no direct sources for this information.

Self-reported prevalence

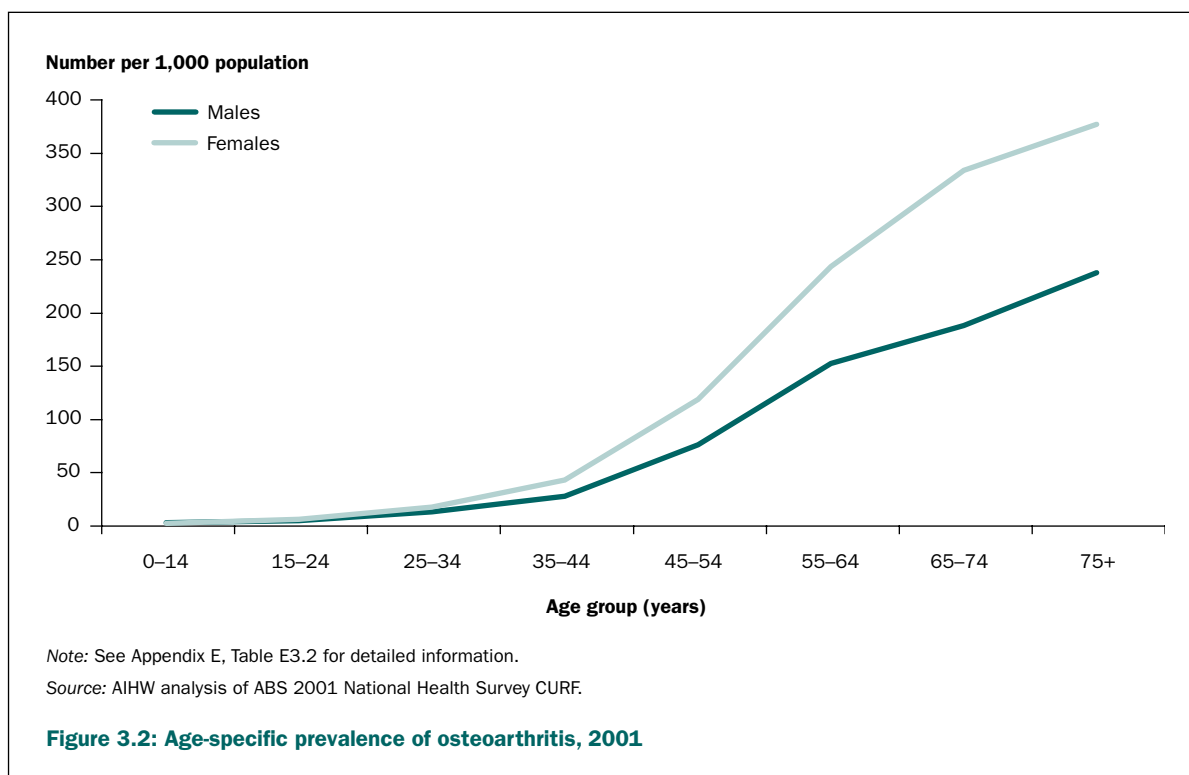
In the 2001 NHS, about 75 out of 1,000 Australians reported osteoarthritis. This equates to around 1.4 million people. This estimate is based on the NHS question: whether the survey respondent 'currently has osteoarthritis'. The NHS survey assumes all reported cases of osteoarthritis to be long term (i.e. conditions that have lasted at least six months, or that are likely to last six months or more). The prevalence of osteoarthritis increases with age: relatively few people at younger ages report having it. By age 55, however, the prevalence rises sharply (ABS 2002).

Osteoarthritis is reported more frequently by females than males (92 compared with 57 per 1,000 persons in 2001). The difference persists across all ages. In 2001, the prevalence was 331 per 1,000, among females aged 65–74, rising to 374 per 1,000 among those aged 75 and over. Comparable rates among males that year were 186 and 236 per 1,000, respectively (Figure 3.2).

Several studies have reported a crossover in osteoarthritis prevalence between the two sexes around the age of 45. Males are affected more commonly below age 45, whereas above age 45 females are affected not only more frequently but also more severely (Kelsey & Hochberg 1988). No such crossover was noted in the NHS self-reports.

Other regional/jurisdictional sources confirm the high prevalence of osteoarthritis in Australia.

- In an omnibus survey of the South Australian population, Hill et al. (1999) estimated the prevalence of osteoarthritis among those aged 15 and above to be around 86 per 1,000 persons (51 per 1,000 males and 111 per 1,000 females). The prevalence increased with age, rising above 261 per 1,000 among those aged 70 and above.
- A study in North Sydney estimated the prevalence of osteoarthritis to be around 79 per 1,000 persons (March et al. 1998).
- Symptomatic osteoarthritis was also reported by more than one-quarter of persons aged 60 and above in the Dubbo Osteoporosis Study (Jones et al. 1995).



There is no regular time series available on the prevalence of osteoarthritis in Australia. The NHS indicates that the prevalence of osteoarthritis has risen from 69 per 1,000 persons in 1995 to 75 per 1,000 persons in 2001. The Survey of Disability, Ageing and Carers (SDAC) categorises osteoarthritis together with other forms of arthritis. No comparative information on that account is therefore available.

Radiological evidence

The radiological evidence suggests much higher prevalence of osteoarthritis than the self-reports. Osteoarthritis-related changes were noted on x-ray in more than 50% of persons over the age of 65, and almost universally in those after age 85 in North Sydney (March 1997).

The radiographic evidence is based on the presence of osteophytes, joint space narrowing, subchondral cysts and bone remodelling, with the severity of the condition, graded from none (0) through doubtful (1), minimal (2) and moderate (3) to severe (4). One of the problems with this case definition is that many people with positive x-ray findings report no pain or disability (Lawrence et al. 1966). Conversely, some individuals report pain but show no radiological evidence. In addition, primary sources of data on osteoarthritis are based on radiographs of only a few joints in each person (McDuffie et al. 1987).

Incidence

Direct estimation of the incidence of osteoarthritis is difficult. The Australian Burden of Disease Study, using DISMOD software to model epidemiological parameters, estimated the incidence of radiological osteoarthritis in Australia to be 2.9 per 1,000 females and 1.7 per 1,000 males (AIHW: Mathers & Penm 1999). This translates to some 27,000 new cases annually. The incidence increases with age. It is highest among females between the ages of 65 and 74 (14 per 1,000) and among males aged 75 and over (9 per 1,000).

To date, no prospective population-based study has been undertaken in Australia to estimate the incidence of osteoarthritis. More recent longitudinal surveys in the United Kingdom suggest that the incidence may be higher, with 20–30 per 1,000 females aged 50 to 60 developing new radiological knee, hip and spinal osteoarthritis each year.

Estimating the prevalence and incidence of osteoarthritis is complicated by a variety of factors. The estimates may vary depending upon the number of joints studied, the age and sex of the respondents, and the reporting method used (physical examination, x-ray, self-report). The correspondence between the radiological evidence, clinical features and self-assessment is also variable.

Disease severity and disability

Activity limitation and other disability are unwelcome consequences of osteoarthritis. As the disease progresses, the pain becomes more severe and incapacitating. The correlation between radiographic evidence and pain severity also increases. Severe pain and functional limitations impact strongly upon the wellbeing of the individual.

Limitations in activities of daily living

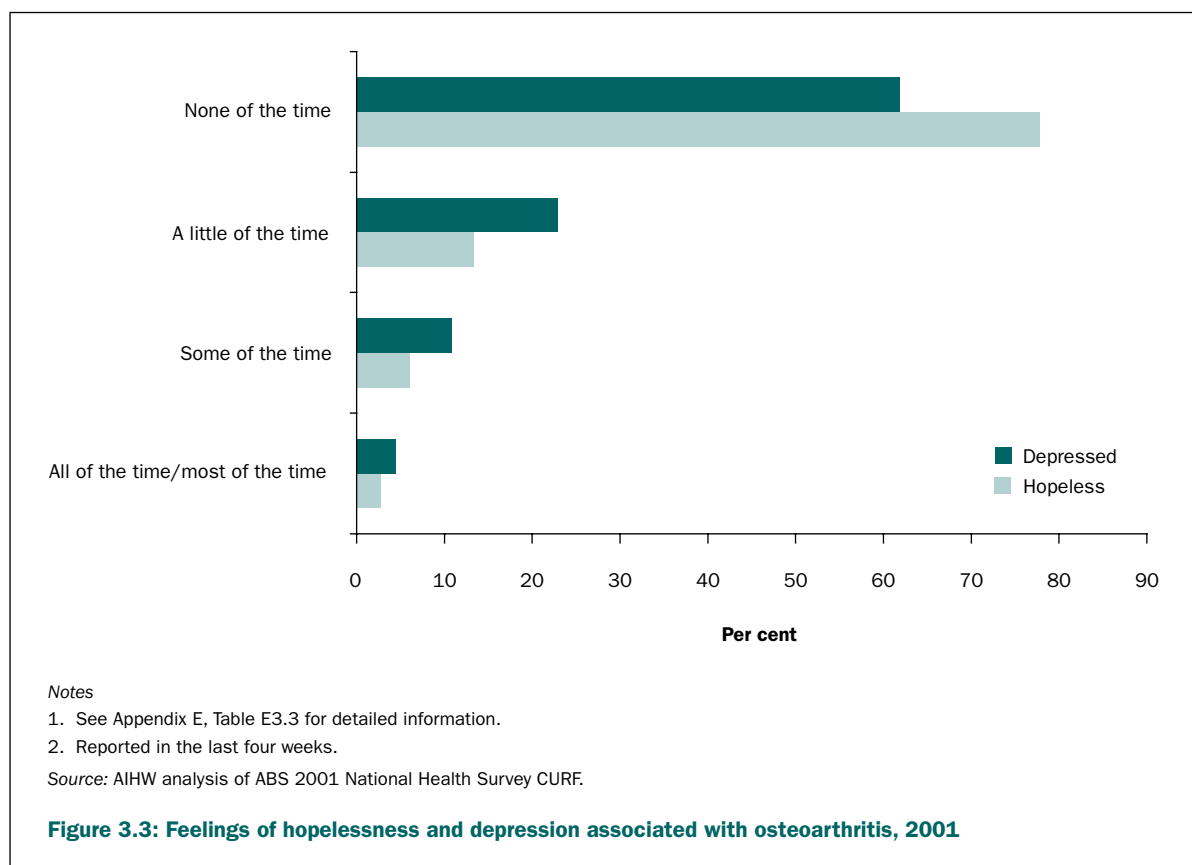
According to the 2003 SDAC, 14% of people with a disability report arthritis and related disorders as their main disabling condition (see Chapter 2). Reported were restriction in activities of daily living such as bathing, toileting, dressing, eating and mobility. The SDAC does not, however, provide specific information on restriction in activities of daily living in relation to osteoarthritis.

A literature search reveals the considerable impact of osteoarthritis on functional ability, particularly in the elderly. It has been reported to be the most common self-reported cause of restriction in activities of daily living (Ettinger et al. 1994). People with osteoarthritis are also reported to have significantly lower quality of life scores in physical function and role limitations (Hill et al. 1999). A particular nexus exists between knee and hip osteoarthritis and dependence on others in performing daily activities (Sharma et al. 2003; Steultjens et al. 2000; Guccione et al. 1994). Females are more likely to report limitations, the use of assistance as well as a greater degree of disability, particularly for daily living activities (Murtagh & Hubert 2004).

Psychological effects

The bodily pain associated with osteoarthritis also has psychological impacts: people with pain from osteoarthritis have significantly lower quality of life (Hill et al. 1999). They also suffer from various psychosocial problems such as anxiety, depression and a sense of helplessness (Keefe et al. 2002; Creamer et al. 1999).

Limited national information linking osteoarthritis with various psychological effects has become available. Data on the distribution of psychological problems among those reporting osteoarthritis in the 2001 NHS are presented in Figure 3.3.



Prevention and management

Limited primary prevention measures have been identified for osteoarthritis. On the basis of current knowledge, avoiding joint trauma, preventing obesity and modifying occupation-related joint stress through ergonomic approaches are all recommended for the prevention of osteoarthritis (Scott & Hochberg 1998).

There are not many management options available to reduce the disease burden for people with osteoarthritis either. As there is no cure (Felson 2000), osteoarthritis management is primarily concerned with controlling the pain and improving the functioning and quality of life. Some of the management guidelines for osteoarthritis are outlined in Box 3.2.

Box 3.2: Management of osteoarthritis

- Education
- Occupational assessment
 - aids
 - appliances
 - joint protection
- Physical therapy
 - aquatherapy
 - aerobic exercise
 - heat
 - strengthening
 - ultrasound stimulation
 - transcutaneous electrical nerve stimulation (TENS)
- Weight loss
- Pharmaceuticals
 - Paracetamol (increase up to 4 g/d)
 - Non-steroidal anti-inflammatory drugs (NSAIDs)
 - Cyclooxygenase-2 (COX-2) selective inhibitors
- Other therapies
 - Topical creams
 - Glucosamine chondroitin
 - Tramadol hydrochloride
 - Opioid therapy
- Interarticular injections
 - corticosteroids
 - hyaluronic acid replacement
- Surgical intervention

Source: DeAngelo & Gordin 2004.

The current management strategies produce a range of outcomes. Educating people with osteoarthritis can help them to understand the disease process, its prognosis and the rationale for and implications of managing their condition, for example by making lifestyle changes and increasing physical activity.

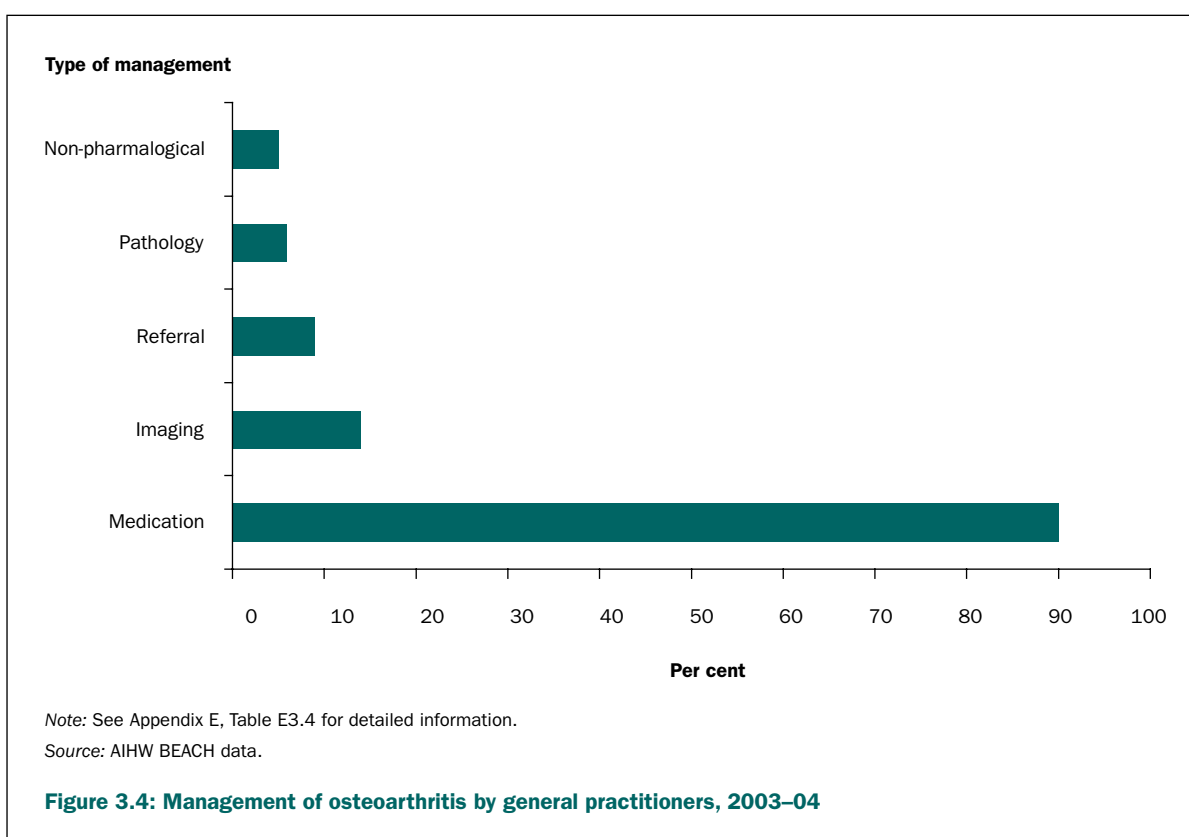
Evidence-based research concurs with existing expert guidelines that exercise is a safe and effective intervention for osteoarthritis. Benefits include strengthening muscle and improving joint stability—shown by Roddy et al. (2005) to improve function and reduce pain in people with hip and knee osteoarthritis—better self-esteem, weight reduction and improved general health. In addition, the number of contraindications are relatively few.

Topical treatment (e.g. methylsalicylate or capsaicin cream) is appropriate as an adjunct to simple analgesia, or for people who cannot tolerate systemic therapy. Quantitative systemic review of topically applied non-steroidal anti-inflammatory drugs (NSAIDs) have shown these agents to be effective in patients with osteoarthritis (DeAngelo & Gordin 2004).

The treatment and care of people with osteoarthritis covers a wide variety of settings and phases of care. These include primary care by general practitioners and other allied health services such as physiotherapists, chiropractors and podiatrists. In advanced cases that do not respond to treatment, surgical treatments have been reported to be a cost-effective intervention (Brooks 2001).

General practice visits

The management of osteoarthritis generally begins with the general practitioner (GP). In 2003–04, osteoarthritis was the seventh most frequently managed problem by GPs (1.9% of all problems managed). One thousand GPs (a random sample) from across Australia reported treating 2,748 persons with osteoarthritis. A variety of management strategies was used (Figure 3.4). The most common was medication prescribed, advised or supplied (90%). Some of the commonly prescribed/recommended medications by GPs are listed in Table 3.2.



Anti-inflammatory drugs such as COX-2 inhibitors were preferred to pure analgesic agents in relieving osteoarthritis pain. Summed together, COX-2 inhibitors (33%) were the most common medications prescribed or advised, followed by paracetamol. Other common forms of osteoarthritis management include x-ray of the knee, followed by x-ray of the hip. The most common referral was to an orthopaedic surgeon and the most common pathology tests were for full blood counts.

Table 3.2: Medications prescribed/recommended for osteoarthritis by general practitioners, 2003–04

Medicine	Number of prescriptions	Per cent
Paracetamol	499	20.2
Rofecoxib	424	17.1
Celecoxib	405	16.3
Meloxicam	166	6.7
Diclofenac sodium systemic	146	5.9
Paracetamol/codeine	144	5.8
Tramadol	122	4.9
Ibuprofen	52	2.1
Naproxen	45	1.8
Other medications	473	19.1
Total	2,476	100.0

Source: AIHW BEACH data.

Hospitalisation

A significant proportion of people with osteoarthritis are hospitalised for surgical procedures. The most common surgical procedures for osteoarthritis are described in Box 3.3.

Box 3.3: Common surgical procedures for osteoarthritis

- **Osteotomy:** performed in people with early osteoarthritis and may relieve symptoms and slow the rate of progression.
- **Arthroscopy:** arthroscopic debridement and lavage can successfully alleviate symptoms, particularly in the case of degenerative meniscal tears in the presence of mechanical symptoms. However, when there is substantial joint-space narrowing, arthroscopic surgery has limited benefit.
- **Arthrodesis:** or joint fusion, successfully alleviates pain and is commonly performed in the spine and in small points of the carpus, hand and foot.
- **Arthroplasty:** total joint arthroplasty represents the most significant advancement in the treatment of osteoarthritis. It is the mainstay of surgical treatment of the osteoarthritic hip, knee and glenohumeral joint; the pain and disability of end-stage osteoarthritis can be eliminated, restoring patients to near normal function.

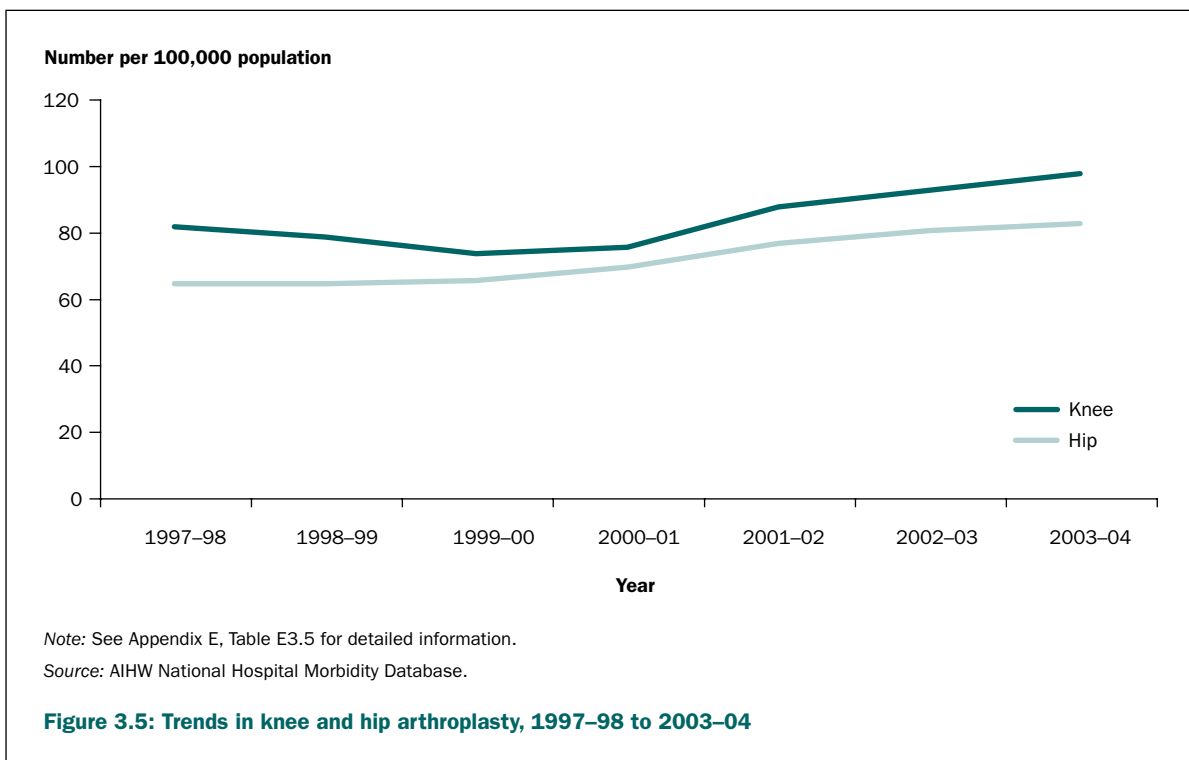
In 2003–04, a total of 77,484 surgical procedures were performed on persons with the principal diagnosis of osteoarthritis. The average length of hospital stay was 7.2 days. Of the ten most frequent surgical procedures reported for osteoarthritis, total joint arthroplasty was the most common form of intervention, followed by arthroscopic procedures (Table 3.3). Arthroplasty of the knee was common among females, mainly in the 75–79 years age group. Arthroplasty of the hip, on the other hand was more common among 70–74 year old males. The number of arthroplasty procedures has increased over the seven years since 1997–98 (Figure 3.5), showing similar increases for both knee and hip arthroplasty.

Table 3.3: Top ten surgical procedures performed on people with osteoarthritis, 2003–04

Procedure block	Main procedure performed	Number of separations	Per cent ^(a)
Arthroplasty of knee	Total arthroplasty of knee, unilateral	19,933	25.7
Arthroplasty of hip	Total arthroplasty of hip, unilateral	16,913	21.8
Arthroscopic meniscectomy of knee with repair	Arthroscopic meniscectomy of knee with debridement, osteoplasty or chondroplasty	7,329	9.5
Arthroplasty of knee	Hemiarthroplasty of knee	3,210	4.1
Other incision procedures on knee	Arthroscopy of knee	2,129	2.7
Other repair procedures on knee or leg	Arthroscopic chondroplasty of knee	1,920	2.5
Arthroscopic excision of knee	Arthroscopic debridement of knee	1,755	2.3
Arthroscopic excision of knee	Arthroscopic meniscectomy of knee	1,384	1.8
Removal of loose body of knee with repair	Arthroscopic removal of loose body of Knee with debridement, osteoplasty or chondroplasty	1,059	1.4
Arthroplasty of knee	Total arthroplasty of knee, bilateral	809	1.0
Other procedures		21,043	27.2
Total		77,484	100.0

(a) Per cent of total procedures performed.

Source: AIHW National Hospital Morbidity Database.



Non-surgical procedures

In 2003-04, a total of 732,700 non-surgical procedures were listed for people with the principal diagnosis of arthritis or a musculoskeletal condition. These procedures, mainly non-invasive in nature, included cognitive, therapeutic or diagnostic interventions. Of these 732,700 non-surgical procedures, 208,916 were listed for people with the principal diagnosis of osteoarthritis.

Visits to other/allied health professionals

Allied health services are an integral component of osteoarthritis management. According to the 2001 NHS, 23% of people with osteoarthritis had consulted an allied or other health professional within the previous two weeks of the survey. The allied or other health professionals most frequently consulted were chemists (5%), physiotherapists/ hydrotherapists (4%) and chiropractors/podiatrists and chiropractors (3%).

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