

The unrecognised  
burden of osteoarthritis:  
unmet needs in Europe

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## About this report

*The unrecognised burden of osteoarthritis: unmet needs in Europe* — is an independent report by the Economist Intelligence Unit, sponsored by Pfizer, a pharmaceutical company. It looks at the impact of osteoarthritis (particularly of the knee and hip) on individuals and wider society, including patients' needs and the challenges in meeting them.

The findings of the report are based on a literature review and interviews with healthcare professionals and patient representatives. Our thanks are due to the following for their time and insights (listed alphabetically):

- **Professor Francis Berenbaum**, Professor of Rheumatology at Sorbonne University, Head of the Department of Rheumatology at AP-HP Saint-Antoine Hospital and team leader INSERM CDR Age Related Joint Diseases and Metabolic Disease Institute, France
- **Neil Betteridge**, Director, Neil Betteridge Associates, independent patient advocate living with osteoarthritis and former CEO of Arthritis Care, UK
- **Dr Loreto Carmona**, Scientific Director, Instituto de Salud Musculoesquelética (Inmusc), Madrid, Spain
- **Dr Francisco Castro-Domínguez**, Consultant Rheumatologist Centro Médico Teknon and Coordinator for the Spanish Society of Rheumatology Osteoarthritis Working Group, Spain
- **Professor Philip Conaghan**, Director, Leeds Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds, and Deputy Director, NIHR Leeds Biomedical Research Centre, UK
- **Professor Karsten Dreinhöfer**, Professor in Orthopaedics and Traumatology, Charité Universitätsmedizin Berlin and Medical Park Humboldtstraße, Germany
- **Professor Krysia Dziedzic**, Director, Impact Accelerator Unit, NIHR Senior Investigator and Professor of Musculoskeletal Therapies, Keele University, UK
- **Lotta Håkansson**, Chair of the Swedish Rheumatism Association (Reumatikerförbundet), Sweden
- **Tiziana Nava**, Physiotherapist and rheumatological rehabilitation consultant, and Lecturer at University of Milan, Vita-Salute San Raffaele University, and University of Milan-Bicocca, Milan, Italy
- **Professor Ola Rolfson**, Professor of Orthopaedics, University of Gothenburg, Sweden
- **Jane Taylor**, Chair of Versus Arthritis patient insight partner group, UK
- **Dr Nicola Veronese**, Geriatrician, University of Palermo, Italy
- **Professor Tony Woolf**, Chair of the Arthritis and Musculoskeletal Alliance (ARMA) and Honorary Professor of Rheumatology at the University of Exeter Medical School, UK

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## Executive summary

Osteoarthritis (OA) is a chronic degenerative joint condition that leads to joint pain, stiffness and mobility problems. It affected 57 million people in Western Europe in 2019, with ageing populations and escalating levels of obesity contributing to a 54% rise in the past 30 years. OA is also a leading cause of disability in the region, responsible for the loss of 2 million years of healthy life. About two-thirds of those affected also have comorbidities such as cardiovascular disease or mental illness. People with OA also have higher mortality rates than the general population, in part due to more cardiovascular deaths.

In this report we look at the impact of OA in Europe, focusing on France, Germany, Italy, Spain, Sweden and the UK. Our key findings were that:

### **Over half of people with OA live with moderate or severe pain, and OA impacts all aspects of life**

Most people diagnosed with OA live with pain, and over half report it as moderate or severe. Almost all people with OA (91% in one international survey) report that it limits their ability to perform normal activities of daily life. About half say it affects their work, and 37% say it affects their social life. More severe OA pain is associated with more limitations, poorer mental health and lower quality of life.

### **Healthcare costs associated with OA are in the billions, and indirect costs may be even higher**

Direct healthcare costs associated with OA are known to be high; less widely appreciated are its indirect costs. These costs arise from OA affecting people's productivity at work, causing work absences and potentially early retirement. For those unable to work,

governments need to provide income support or disability allowances. There may also be the cost of additional care and home adaptations, to which patients may need to contribute. These costs affect patients, their families, employers and the wider economy. Annual direct healthcare costs in our focus countries have been estimated at between €0.2bn and €7.2bn and indirect costs between €0.2bn and €4.6bn. These indirect costs are likely to be underestimated, and some evidence suggests they could be up to four times as high as direct costs.

### **People are not always able to access effective non-pharmacological treatments**

National and international guidelines agree that the core management of OA includes support for self-management, muscle strengthening exercise, and weight loss where needed. However, of our focus countries, only Sweden provides such a programme nationwide. Data suggests this programme reduces pain, improves physical activity, reduces OA-related work absences, and also delays surgery in some patients. A similar programme in the UK has been estimated to provide a five-fold return on investment by reducing use of healthcare services.

### **Available pharmacological treatments are not suitable for many patients, or for long-term use**

The lack of effective pharmacological treatments was an area of unmet need commonly highlighted by clinicians we interviewed. There are currently no drug treatments that can stop or reverse the joint damage in OA. Options are limited to symptomatic treatments such as simple painkillers or non-steroidal anti-inflammatories (NSAIDs). Yet NSAIDs are

contraindicated or should only be used with caution in many people with OA due to risks such as gastrointestinal or cardiovascular side effects, which increase with patient age. This leaves many to consider the use of opioids, which is controversial as they have a risk of dependency. When prescribed, NSAIDs and opioids are intended to be short-term solutions only. Many people living with OA are dissatisfied with their OA treatment, with between 27% and 54% having pain despite taking prescription medication.

### **People can wait months for joint replacement, a situation being worsened by the covid-19 pandemic**

Joint replacement is a last resort for people with pain and functional disability which has not responded to conservative treatments. Rates of hip and knee replacement vary markedly between countries and do not reflect the prevalence of OA. In some cases this may reflect a lack of nationally agreed and adopted criteria for selecting individuals for joint surgery. Waiting times for these operations also vary, leaving some patients waiting for months with persistent pain. This is being exacerbated by the covid-19 pandemic, which has disrupted provision of joint replacement. While many of those who have joint replacement surgery have a successful outcome, between 10% and 20% still experience long-term pain.

### **Despite its impact OA lacks visibility and is not high on policy agendas**

There was widespread agreement among the experts interviewed that OA is not sufficiently prioritised and attracts insufficient resources for both care and research. Even with a growing focus on non-communicable diseases, OA is not given as high a priority as life-threatening conditions such as cardiovascular disease, cancer and diabetes. This may in part be due

to a perception of OA being an inevitable consequence of ageing rather than a disease, and the fact that it does not directly cause death. As Professor Karsten Dreinhöfer, Charité Universitätsmedizin Berlin and Medical Park Humboldtmühle, Germany, puts it: “[For] more than 20 years we have been trying to convince individual governments, as well as the WHO, to put [musculoskeletal] conditions at the forefront—or at least the appropriate level [commensurate with disease burden], but it is never seen as a dramatic issue.”

### **Moving forward to meet the needs of people with OA**

The range of healthcare professionals involved in OA management can lead to fragmented care, which could be addressed by more coordinated multidisciplinary working. Services could be better designed to make optimal use of available management options for pain, including psychological support. Given the benefits of non-pharmacological treatments in particular, enabling widespread provision of these should be a priority. Patient and professional education on the effectiveness of these approaches could support their uptake. Meanwhile, more research into OA could help pave the way to improved diagnosis, treatments and care.

It is clear that there is considerable unmet need in OA, with costs to people’s quality of life, to healthcare systems and to the wider economy. With the trend for increasing life expectancy and later retirement, the societal impact of OA is only likely to increase. New initiatives, such as the WHO’s Decade of Health Aging starting in 2021, an ongoing Lancet Commission on OA, and the upcoming first WHO meeting on musculoskeletal conditions, provide a unique opportunity to ensure that OA is placed firmly on the global health agenda so that these unmet needs can be addressed.

## Osteoarthritis: a painful and growing burden

Osteoarthritis is “a gateway condition to ill health in ageing populations.”

*Professor Tony Woolf, Chair of the Arthritis and Musculoskeletal Alliance (ARMA) and Honorary Professor of Rheumatology at the University of Exeter Medical School, UK*

### Key takeaways

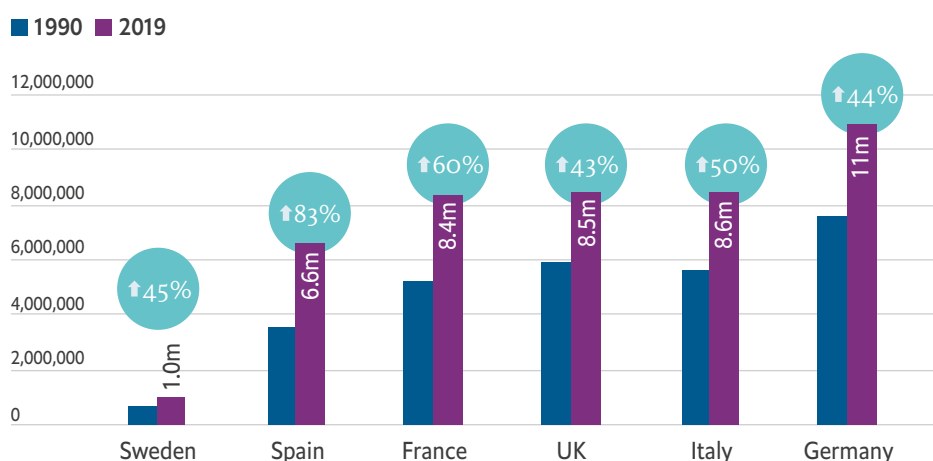
- 57 million people in Western Europe have osteoarthritis (OA), an increase of 54% in the past 30 years.
- OA causes the loss of 2m years of healthy life in the region.
- Over 50% of people with OA live with moderate or severe pain.
- Pain from OA limits people's everyday activities.

### OA affects millions of Europeans, and the numbers affected are growing

OA is a chronic degenerative joint condition, characterised by deterioration of the cartilage that protects the articulating bone surfaces in the joints, and damage to the bone underneath.<sup>1</sup> It causes symptoms such as pain, stiffness, ‘locking’ sensations, creaking or grinding of joints (called crepitus) and mobility problems. It can affect any joint in the body, and can have significant impact on a person's ability to function normally and their independence. People with OA are also more likely to have chronic comorbidities such as cardiovascular disease and mental health problems.<sup>2</sup>

OA is one of the most common physical health conditions, affecting 57 million people in Western Europe in 2019.<sup>3</sup> The prevalence of this painful and debilitating condition is increasing, with 54% more people affected in the region in 2019 than in 1990. The prevalence in our focus countries also follows this pattern (see Figure 1). Among our focus countries in 2019, OA as a whole was least common in Sweden, and most common in Spain (see Figure 2).

**Figure 1**  
Number of people with OA in focus countries in 1990 and 2019



The increase in OA prevalence reflects rising life expectancy and rates of obesity, which are expected to continue. Age and obesity are key risk factors for OA, along with female gender, low levels of physical activity, trauma and work-related injury.<sup>5</sup>

Around half of the population in our six countries of focus is overweight or obese, ranging from 46% in Italy to 64% in the UK.<sup>6</sup> Roughly a third do not achieve recommended levels of physical activity.<sup>6</sup> The European population is also ageing: by 2050 it is estimated that the EU will have 58 million more people aged 65 and over.<sup>5</sup> These factors presage continued increases in the prevalence of osteoarthritis.

### Disability burden caused by OA is high and increasing

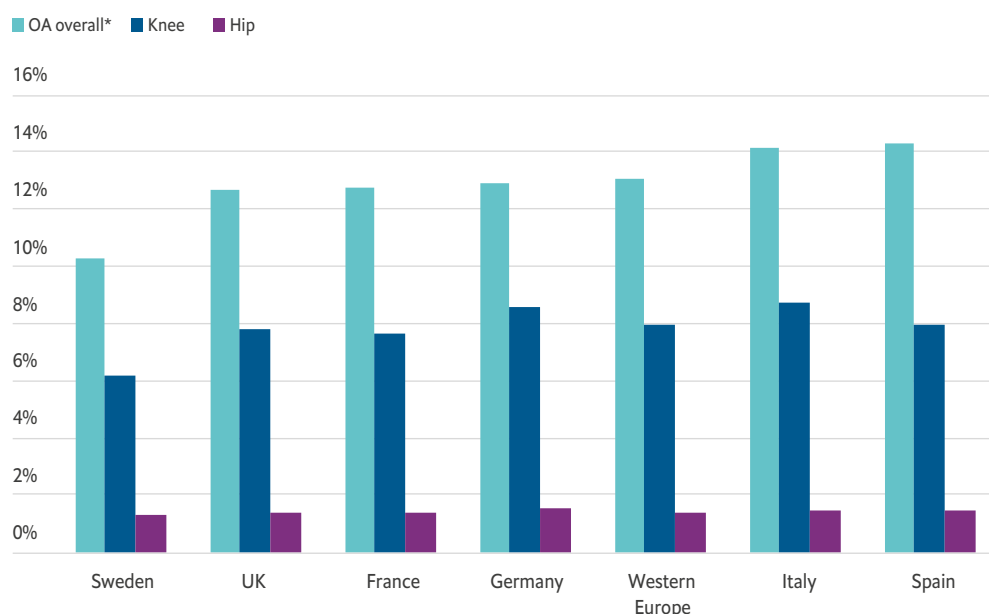
Overall, OA caused about 2 million years lived with disability (YLDs) in Western Europe in 2019, a 36% increase since 1990.<sup>3</sup> Total years

lived with disability attributable to OA in our focus countries in 2019 ranged from 275,405 in Germany to 25,580 in Sweden (a much less populous country). When standardised by population size, the highest rate of disability was in Spain (541 YLD per 100,000) and the lowest in Sweden (367 YLD per 100,000).

Accordingly, OA is an increasing cause of disability-adjusted life years (DALYs) for people aged 50 to 74. DALYs combine both YLDs and years of life lost due to premature mortality. OA was the 18th leading global cause in 2019, up from 24th in 1990. OA now accounts for 1.5% of DALYs for this age group, up from 1.1% in 1990.<sup>7</sup>

However, DALYs by their nature prioritise conditions with associated mortality, because one year of life lost is one 'whole' DALY, whereas a year lived with disability is counted as a fraction of a DALY. Some clinicians feel that DALY measurements, while useful,

**Figure 2**  
Prevalence (%) of osteoarthritis (OA) of the knee, hip and overall in our focus countries in 2019



\*Overall prevalence includes OA of the hand, foot, knee, hip and other joints  
Source: Global Burden of Disease Study 2019, Institute for Health Metrics and Evaluation

mean that non-fatal but painful and disabling conditions such as OA are not given the priority they deserve.

“The majority of health policy decisions are based on mortality, so if you look at burden of disease data it is always based on years [of life] lost, a bit on DALYs - but they are predominantly dominated by mortality data and not by disability,” said Professor Karsten Dreinhöfer, Professor in Orthopaedics and Traumatology, Charité Universitätsmedizin Berlin and Medical Park Humboldtmühle, Germany.

Although OA does not directly cause death, studies have suggested that having OA is linked with an increased mortality risk.<sup>8</sup> For example, a cohort study from England reported in 2011 that people with OA had a 55% higher mortality rate than expected for their age and gender, with cardiovascular disease being one of the main contributors to excess mortality.<sup>9</sup> Interestingly, the presence of a walking disability was one of the factors independently associated with this increase in risk.

“The message we as rheumatologists try to deliver is that when you have knee or hip OA decreasing your capacity to walk, then you increase [patients’] mortality,” said Professor Francis Berenbaum, Professor of Rheumatology at Sorbonne University, Head of the Department of Rheumatology at AP-HP Saint-Antoine Hospital and team leader INSERM CDR Age Related Joint Diseases and Metabolic Disease Institute, Paris, France.

### Over half of people with OA live with moderate or severe OA pain

Pain is one of the main symptoms of OA and causes a substantial burden for patients:

- 84% of people with OA in a global survey had joint pain or tenderness.<sup>10</sup>
- 54% of European participants with hip

or knee OA in the multinational Adelphi OA Disease Specific Programme (DSP; 1,547 participants) reported living with moderate or severe pain.<sup>11</sup>

- 60% of people with OA from five European countries in the National Health and Wellness Survey (NHWS; 2,417 participants) were in moderate or severe pain: 27% despite being treated with prescription medication and 32% who were not currently receiving prescription medication.<sup>12</sup>

Professor Philip Conaghan, Director of the Leeds Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds, and Deputy Director NIHR Leeds Biomedical Research Centre, UK, said: “Pain interferes with your life in a whole lot of ways, losing function interferes with your life in a whole lot of ways, and the combination of those means a big load of problems for patients.”

There is also clear interaction between the pain and disability associated with OA and cardiovascular and mental health conditions.<sup>13</sup> Greater pain among people with OA is associated with higher levels of current and



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future depression and anxiety symptoms.<sup>14</sup> Cardiovascular disease and mood disorders become more common with greater functional disability in people with OA.<sup>13</sup> Presence of comorbidities such as cardiovascular disease also predicts greater deterioration in OA pain and physical functioning.<sup>15</sup>

Professor Conaghan said mental health conditions may be “the result of people who have had chronic pain, poor sleep, poor mood,” and that the impact of OA was “all tied up together” with conditions such as anxiety and depression.

Professor Woolf agreed: “A lot of priority is put on mental health, but forgetting that sometimes mental health problems manifest as chronic pain. It also makes it harder to cope with chronic painful conditions. The impact of OA therefore becomes much greater if a person also becomes depressed and anxious about their future.”

### **OA restricts what people can do on a daily basis and lowers quality of life**

“One of the least articulated issues is impact on personal life, the misery it can inculcate at family level. It can make a big difference. For a couple in their 30s or 40s, it could have a big effect on intimacy or family planning. For an older person, not being able to pick up their grandchild.”

*Neil Betteridge, Director, Neil Betteridge Associates, independent patient advocate living with OA and former CEO of Arthritis Care, UK*

OA results in poorer quality of life and restricts people’s activities and participation in society. A Spanish study demonstrated that people with OA had poorer quality of life than the general population across all domains of health: pain/discomfort, mental health, mobility, self-care and the ability to perform activities of daily living.<sup>16</sup> This echoed the findings of a systematic review including 62 studies (20 from Europe) in people with knee OA.<sup>17</sup> Notably, this review found that those who had been given help with self-management of their OA reported better quality of life.

In an international study, 91% of people with OA reported limitations to their everyday physical activities, 49% said they were limited in how they could work and 37% said OA limited their social interactions.<sup>10</sup> Increasing intensity or frequency of pain was associated with increased impairment of activities.

A UK study of 1,532 people with hip or knee OA aged over 64 years showed that more than a third (36%) had mobility problems compared with only 11% of a matched population without OA. Eight percent had self-care limitations compared with 2% of the general population.<sup>18</sup>

There is a clear association between the severity of pain and the effect on quality of life and daily activities. Both the Adelphi DSP and NHWS analyses found that moderate or severe OA pain was associated with poorer quality of life.<sup>11,12</sup> The NHWS found that people across five European countries with moderate or severe OA pain scored lower on a measure of health status that included mobility, the ability to care for oneself and carry out usual activities, compared with those with untreated mild pain.<sup>12</sup> People receiving treatment for moderate or severe pain were also more likely



to be absent from work or to have reduced productivity while at work, compared with those with untreated mild pain.

The Adelphi DSP additionally showed that patients with moderate to severe OA pain had greater stiffness and physical function limitations compared with those with mild or no pain.<sup>11</sup> Those who had moderate to severe pain despite taking opioids had the poorest outcomes:

- 87% had limitations to their mobility (vs 52% among those with minimal pain not requiring opioid treatment);
- 67% needed a walking aid (vs 30%);
- 49% needed help with activities of daily living (vs 10%);
- 45% had suffered a fall (vs 18%).

Impairment of function has a “broad and personalised” impact on people’s lives, said Professor Conaghan: “For one person their most important activity might be going to work every day. For another it might be being

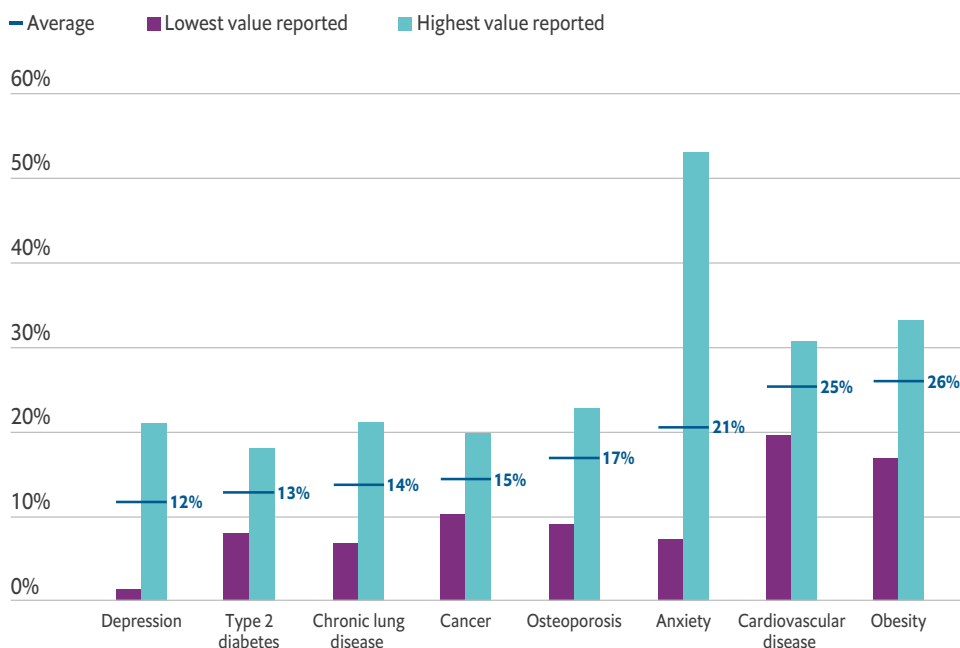
strong enough to care for their grandparent who they are the main carer for. Someone else, it might be going to walk in the park with their grandchildren is the most important thing.”

OA can also create barriers to accessing treatment for comorbid conditions. Many people with OA (about two-thirds) have at least one other chronic condition,<sup>2</sup> and Figure 3 shows common comorbidities in our focus countries.<sup>13</sup> Professor Conaghan illustrates the impact of this through a conversation with a patient who told him: “I’ve got chronic renal impairment and have an annual blood test. I’ve got glaucoma and I’ve got eye drops for that. I’ve got high blood pressure and I take pills. I’ve got prediabetes, meaning I have regular blood tests to see if I’m turning diabetic. But I can’t get to any of my appointments because of the pain in my knee.”

Pain and mobility limitations in OA may also mean that people with cardiovascular disease feel unable to take the physical exercise that is recommended to improve both OA and cardiovascular risk. Some cardiovascular

**Figure 3**

Prevalence of common comorbidities affecting people with OA in the EPOSA study



Average data is for the overall sample, weighted for age and gender [France not included in EPOSA; ranges only given for focus countries]

Source: EPOSA Study, Zambon et al. 2016

conditions mean that non-steroidal anti-inflammatory drugs (NSAIDs), a mainstay of pain relief for OA, are contraindicated.

Jane Taylor, a patient representative and Chair of the UK's Versus Arthritis patient insight partner group, has lived with rheumatoid arthritis since her 20s and then developed OA in her 40s. She says restrictions due to OA are under-recognised: "I remember giving a talk and saying what's stopping me doing everything isn't my rheumatoid arthritis, because that's quite well controlled, it is my OA, and I'm having to give up more and more things."

While restrictions on daily activities are a major burden for people with OA, they also carry an economic cost, in terms of the need for support with self-care and mobility, and reduced participation in economic activity.



**I remember giving a talk and saying what's stopping me doing everything isn't my rheumatoid arthritis, because that's quite well controlled, it is my OA, and I'm having to give up more and more things."**

Jane Taylor, Chair of Versus Arthritis patient insight partner group, UK

## The economic impact of osteoarthritis

### Key takeaways

- In Western Europe, 43% of those affected by OA are of working age.
- Between 5% and 22% of people with OA report having missed some work due to OA in the past year.
- OA also causes presenteeism and may cause some people to leave the workforce early.
- Annual healthcare costs for OA in our focus countries have been reported as up to €7.2bn, and indirect costs up to €4.6bn.
- These figures may underestimate indirect costs, as presenteeism is rarely accounted for.

### Pain and disability may push people with OA out of work

People with OA are “leaving work early, so being lost to the labour market at a personal and societal cost”

*Professor Tony Woolf, Chair of the Arthritis and Musculoskeletal Alliance, and Honorary Professor of Rheumatology at University of Exeter Medical School*

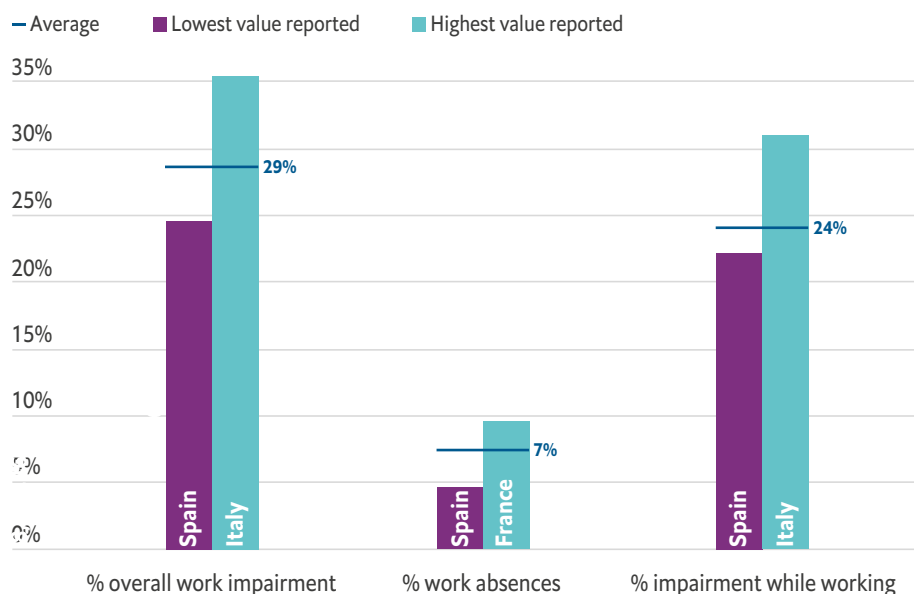
Despite OA being perceived as a disease of the elderly, in Western Europe 43% of those affected are of working age (<65 years old).<sup>3</sup> OA can impact people’s work lives: they may be unable to perform certain tasks, miss work, and potentially need to take early retirement. Given the scale of OA, the potential effects on the wider economy are significant.

Systematic reviews have found that limitations in work capacity or job effectiveness are more common in people with hip or knee OA.<sup>19-21</sup> One review found strong evidence that knee pain associated with OA is linked to work absences (absenteeism).<sup>19</sup> Between 5% and 22% of patients report missing work due to OA in the past 12 months. There is also some evidence of an impact on productivity while at work (presenteeism), although fewer research studies have quantified this. Another review, reported as a conference abstract, found that pain from OA led to poorer physical functioning, causing loss of work productivity.<sup>21</sup>

The potential scale of the impact on work in our focus countries can be seen in an analysis of data from 3,750 people (average age 60 years) with OA from France, Germany, Italy, Spain and the UK, who had taken part in the five-country NHWS study.<sup>22</sup> Almost 60% of respondents were of working age (under 65 years), but only around a third were employed (34%). It is telling that this is lower than the 46% employment rate in similarly aged adults (aged 55 to 64 years) in the EU at the time of the survey (2011).<sup>23</sup> Those who were employed reported disruption to their work due to their OA. On average, they reported missing about 7% of their working time due to OA-related work absences and 24% impairment when working (presenteeism; see Figure 4).<sup>22</sup>

The impact on work increases with greater OA severity and more longstanding pain. Analysis of data from the Adelphi DSP found that greater self-reported OA severity was associated with greater work impairment and a reduced likelihood of being employed.<sup>24</sup>

**Figure 4**  
Impact of OA on work productivity



Source: NHSW Study, Kingsbury et al. 2014

A more recent study from Portugal found that among older adults with OA (aged 50 to 64 years), those who reported having had pain for three months or longer and whose function was more impaired were more likely to be out of work.<sup>25</sup> Interestingly, OA was not significantly associated with official early retirement in this study. The authors suggest that OA may instead force people into unemployment as a “first step to an irreversible out-of-work state”. The link with leaving the workforce is supported by studies from other countries. In one UK survey, about a third of people of working age with OA reported that their condition resulted in them retiring early, giving up work or reducing the hours they work.<sup>26</sup>

Work loss as a result of OA is “a real challenge,” said Professor Woolf. While joint pain may cause temporary absence from work,

eventually people can be forced out of work altogether. “[People are] leaving work early, so being lost to the labour market at a personal and societal cost. And you have people who are in fairly physical jobs—not just building sites or manual labour but warehouse jobs, shelf-stacking—there are a lot of jobs that need the ability to stand, lift and carry, which become a problem. Other jobs need dexterity. OA can impact on any job, even jobs we don’t think are manual.”

Ola Rolfson, Professor of Orthopaedics at the University of Gothenburg in Sweden, suggests that the situation could be alleviated to some degree. “If people learn about their symptoms and how to manage OA we could avoid a lot of sick leave and production losses in society related to OA,” he said. Sweden appears to have had at least some success

in helping patients continue working. Lotta Håkansson, patient representative and Chair of the Swedish Rheumatism Association, said workplace adaptations combined with effective treatment can have a positive effect. “The regulation in Sweden is quite good, in that employers should give you help if you have to stand in your daily work. Of course, if you work in day care nursery with small children, it could be a bit difficult to go down on your knees and play with them, so you may have to change some ways of how you work. But I haven’t heard this catastrophe thing of ‘I had to stop work because of OA.’ I think most people could adjust and employers could adjust in a good way,” she said.

### OA has hidden costs for individuals and economies

“From an economic point of view, [osteoarthritis] translates into a very high cost for society.”

*Professor Francis Berenbaum, Professor of Rheumatology at Sorbonne University, Head of the Department of Rheumatology at AP-HP Saint-Antoine Hospital and team leader INSERM CDR Age Related Joint Diseases and Metabolic Disease Institute, France*

Estimates of total costs of OA to economies are in the billions. Although direct costs are high—in part reflecting the widespread prevalence of the disease—indirect costs may be even higher but are generally less well quantified. These indirect costs are non-healthcare costs that arise as a result of the impact of a person’s OA on their ability to work and care for themselves. They include:

- loss of productivity at work (presenteeism);
- absence from work (absenteeism);

- loss of employment (for example unemployment or premature retirement);
- disability payments or benefits;
- formal or informal carers to provide assistance in the home (costs of formal care are sometimes included in direct costs).

Because these costs are more challenging to capture, the overall burden for people living with OA, their carers and the economies of the countries in which they live is under-recognised. This may contribute to OA being taken less seriously by policymakers, resulting in less investment in both healthcare and research for the condition.

### Financial costs and support for individuals

People with OA may have to find money for at least some of their healthcare, which may include funding drug costs (for example over-the-counter analgesia or paying a contribution for prescriptions) and other treatments. They may also need to fund home adaptations, pay for carers, or even move home because of their disease. Perhaps most importantly, their income may be affected through inability to work.

The level of support offered by the state to people with OA varies from country to country, although all of the countries assessed have at least a minimum level of support. All six countries provide good access to essential health services for their populations, as illustrated by their high scores on the WHO’s universal healthcare service coverage index (scoring between 78 and 87 on the 100-point scale in 2017).<sup>27</sup>

Most countries have a mixture of social insurance models, which are funded through taxation, or social insurance contributions

linked to salary, with a small proportion of healthcare funded by private voluntary insurance.<sup>28</sup> Some systems are free at the point of use (for example, the UK's taxpayer-funded NHS), while others require individuals to pay upfront, with payments reimbursed to a certain level (for example, the French Caisse Nationale d'Assurance Maladie des Travailleurs Salariés).

Out-of-pocket expenses (those met directly by individuals as opposed to the state, public or private insurance schemes) range from 9% (France) to 24% (Spain) of total healthcare costs.<sup>28</sup> This may include payment or co-payment for prescribed medicines, medical devices, and outpatient medical care.

Out-of-pocket expenses for those with OA in France, Italy and Spain have been reported to represent around 30% of total OA costs.<sup>29</sup>

Reports from our expert interviewees suggest that in some countries, people with OA may choose to pay for certain treatments which are non-reimbursable through their national social insurance schemes. In some countries, such as the UK, where care is universally free at the point of use but waiting lists are long, patients may choose to take out private health insurance in order to be treated more quickly by private providers. Private provision can include physiotherapy, intra-articular injections and joint replacement surgery.

Although the majority of people's medical costs will be covered by public funds, the impact of OA on their ability to work could have a greater impact on their financial security. In all six countries, some form of sick pay, disability pension, benefits and allowances are available for people who are unable to work because of long-term medical conditions.<sup>30</sup> However, eligibility

varies according to national criteria, which may include the length of time paying into an insurance fund, assessment by a panel of doctors, level of disability, age and personal income. This may mean that some people won't be eligible for support, and also that the support available may not fully compensate for the income lost. In addition, not all systems include paid carers for people who need assistance in activities of daily living or home adaptations such as stair lifts. In such cases, the person with OA or their families would need to cover these costs themselves.

### Costs for societies are measured in the billions

Studies reporting OA costs for our focus countries at a national level estimate annual direct costs of up to €7.2bn, and indirect costs of up to €4.6bn. According to one review, existing studies suggest OA's cost at the national level could be up to 0.5% of a country's GDP.<sup>31</sup>

These figures are high, but may be underestimates. Reviews which have compiled studies on the socioeconomic costs of OA note that they are hampered by lack of consistency in type of costs measured and the type and severity of OA included.<sup>31-33</sup> A 2014 systematic review of costs from international studies judged that of the 39 studies included, only three had comprehensively assessed all possible areas of cost.<sup>31</sup> Those that include indirect costs focus on absenteeism and rarely attempt to capture the economic impact of presenteeism. Relatively little of the published research on costs of OA has been carried out in Europe: most of the studies have been from the US (22 of the 39 included in one review<sup>31</sup>). Therefore, understanding of the economic impact of OA in the European region is more limited.

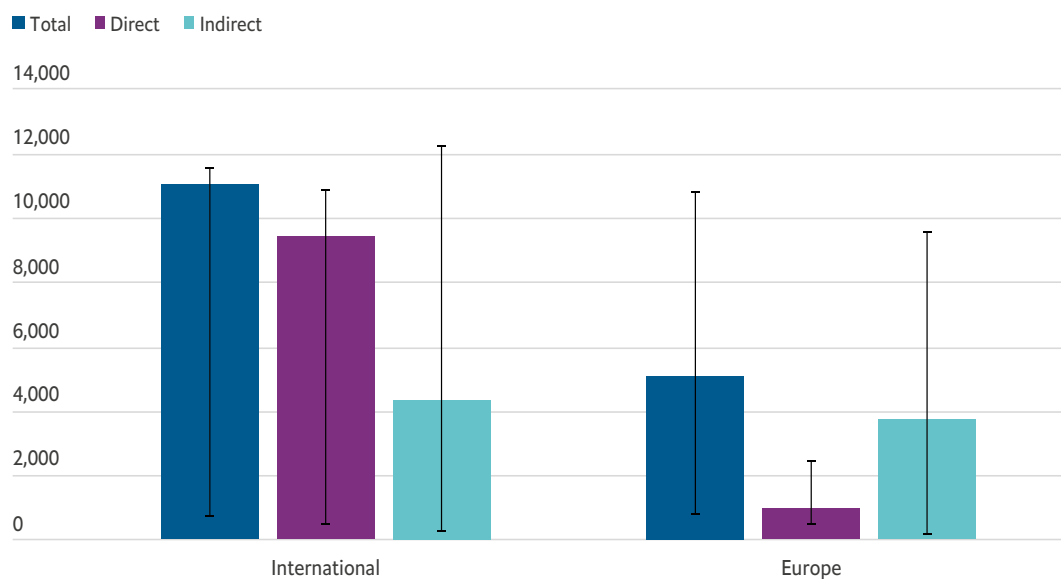
Studies which have estimated costs of OA in our focus countries are summarised in the Appendix.<sup>24, 32, 34-43</sup> At a national level OA direct costs ranged from €0.2bn to €7.2bn, and indirect costs from €0.2bn to €4.6bn.<sup>32, 34, 40-43</sup> The highest estimates came from one of the largest studies identified, which was an analysis of data on national spending and indirect costs associated with OA from Germany in 2002.<sup>43</sup> It quantified indirect costs from absenteeism, disability, and early retirement in terms of loss of gross value added (GVA), a measure of national economic productivity. As the burden of OA has grown since 2002, it is likely that these costs have also grown.

Reported per-patient costs for people with OA also vary. Figure 5 illustrates the average per-patient cost of OA from a recent systematic review and variability in study estimates.<sup>44</sup> Direct costs reported from our focus countries have ranged between €497 and €1,800 and indirect costs between €200 and €8,350.<sup>24, 37, 39, 44</sup>

The only study which included costs associated with lost productivity while at work (presenteeism) as well as absenteeism unsurprisingly gave the highest estimate of indirect costs (€8,350 per patient annually across five of our focus countries, not including Sweden).<sup>24</sup> This study did not quantify direct costs, but in studies which quantified both direct and indirect costs, the latter accounted for between 10% and 81% of the total. Accounting for presenteeism would increase these estimates.

As Dr Francisco Castro-Domínguez, Consultant Rheumatologist at the Centro Médico Teknon and Coordinator for the Spanish Society of Rheumatology Osteoarthritis Working Group, puts it: “Direct costs are known but the full impacts of indirect costs are difficult to capture and might be even bigger. [Some] evidence shows that indirect costs are 60% of the cost [eg the Spanish study by Núñez et al. 2007<sup>35</sup>]

**Figure 5**  
Weighted average annual per-patient costs (€) for people with OA in Europe and internationally



Error bars represent the range of values from pooled studies  
Source: Salmon et al. 2016



but I think probably it's even bigger than that. As long as indirect costs are not direct costs for the hospital directors and people in charge, they are not taking this into account." He said the Spanish Society of Rheumatology was working on a white paper to quantify the costs of unmet need in Spain.

Professor Rolfson added: "It seems like health economists keep publishing reports on the two big problems that cost in society, and that's psychiatric diseases and musculoskeletal diseases. It seems like these kind of reports come out every year and its surprising that politicians don't pay bigger attention to this."

The direct and indirect costs of OA to the individual and the wider economy are considerable and will increase with the growing prevalence of the disease. Getting a better understanding of these for European countries will help to clarify their priority at national and regional levels.

**“It seems like health economists keep publishing reports on the two big problems that cost in society, and that's psychiatric diseases and musculoskeletal diseases. It seems like these kind of reports come out every year and its surprising that politicians don't pay bigger attention to this.”**

Professor Ola Rolfson,  
Professor of Orthopaedics,  
University of Gothenburg, Sweden



## Challenges in meeting the needs of people with OA

### Key takeaways

- Dissatisfaction with treatment is common; only about a third of people with OA are very satisfied with their current OA medication.
- While there is agreement on core non-pharmacological treatments, most countries lack coordinated national provision of these.
- There are no disease-modifying treatments for OA, and available pharmaceutical treatments are not suitable for long-term use, or for patients with certain common comorbidities.
- Despite broad consistency in surgical criteria, joint replacement rates differ between countries, and people in some countries face lengthy waits, a situation exacerbated by the covid-19 pandemic.
- OA care can be fragmented, and a more coordinated multidisciplinary approach is likely to be beneficial.

### Dissatisfaction with symptom relief is common

“The major unmet need which comes out of every patient survey is for reduction in pain, improvement in function and improvement in the consequent quality of life that goes with it.”

*Professor Philip Conaghan, Director, Leeds Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds, and Deputy Director NIHR Leeds Biomedical Research Centre, UK*

Surveys of people with OA give an indication of the levels of unmet need. Dissatisfaction with treatment and pain being unresolved despite treatment are common:

- Only 30% of 3,750 adults with OA participating in the NHWS study reported being very or extremely satisfied with their current OA medication. The level was similar across all countries assessed (France, Germany, Italy, Spain and the UK).<sup>22</sup>
- 42% of people with OA from the US, Spain and Italy participating in a global survey were not satisfied with their treatment.<sup>10</sup>
- 27% of people with OA in the NHWS study reported being in moderate or severe pain despite being treated with prescription medication.<sup>12</sup>
- 54% of 1,187 people with knee OA from six European countries reported inadequate pain relief despite taking prescription medication.<sup>45</sup>

One challenge is the fact that there are currently no disease-modifying treatments available to arrest the progression of OA. Consequently, analgesic and/or anti-inflammatory medications for symptoms, combined with non-pharmacological support, remain the main treatment options, with joint replacement a last resort the usage. However, issues such as comorbidities limit the usage of some of these options.

The lack of options at their disposal was a common theme discussed by clinicians across the countries assessed. For example, Professor Conaghan has led research into inadequate

pain relief and loss of function in patients with knee OA. He said a “substantial amount” of pain was unsuccessfully treated and that “we’ve got very few therapies that work.”

The result, says Dr Nicola Veronese, geriatrician at the University of Palermo, Italy, is that: “To treat pain is a daily fight.”

For Professor Dreinhöfer, the difficulty in successfully managing OA pain also suggests that—especially for knees—it is not entirely due to degeneration of the joint. “Knee pain is a bit like back pain, in that at least 20% have at least some other psychological-dominated issues that might guide their approach to how they are dealing with this problem. Definitely a psychosocial approach needs to be considered in a significant group of people with OA of the knee,” he said.

This inability to successfully relieve pain means that some people have to live with it in the long-term, which as we have seen increases disability and has knock-on effects on their ability to work and participate in normal activities.

### **Covid-19 is likely to increase patient dissatisfaction**

The covid-19 pandemic may further increase dissatisfaction with treatment and lack of symptom relief, due to enforced lack of exercise in lockdowns and reduced service provision.

Professor Conaghan warned that the pandemic would increase demand for musculoskeletal medicine services. “There will be a huge increased burden of [musculoskeletal] pain because most people

have been stuck at home doing nothing. People who maintained some muscle strength now have nothing so everybody is saying they have increased joint pain.”

Services in the UK were suspended or severely curtailed during the worst of the healthcare crisis. “[We] shut down our clinics for weeks, we’re now open again but we’re mostly doing telephone clinics and they are not ideal. Physiotherapy services shut down for about a three month period in the first lockdown. The queues now are positively scary,” he said.

In one orthopaedic centre in Italy, outpatient appointments fell to 239 in one week in April 2020 compared to 8,461 appointments at the same point in 2019, with a median 8,000 consultations per week postponed.<sup>46</sup>

Professor Rolfson from Sweden said, “We are going to see quite a large impact on people’s health due to increased waiting times and the fact they haven’t been able to get the treatment that they need.” He said that research is underway in Sweden to measure the impact on people’s health.

A study from Austria has already demonstrated that pain and function scores continued to deteriorate during the March-May lockdown of 2020 for people whose hip or knee replacement surgery was postponed.<sup>47</sup> It also found that the decline in physical activity enforced by lockdown was associated with greater loss of joint function.



### Guideline recommendations are relatively consistent, but adherence varies

While there is relative consistency in recommended treatments across countries, there is evidence that these recommendations are not being implemented consistently.

Approaches to treatment of OA are codified by national, European and key international guidelines<sup>48-55</sup> (see Appendix for guidelines appraised). While there is some variation in coverage, the key principles are common to most:

- patient education and support for self-management;
- non-pharmacological holistic approaches are central to management, including structured strengthening and aerobic exercises, weight loss if patients are overweight/obese and assistive devices (eg walking aids) if needed;
- comorbidities should be considered

when making decisions about management, especially prescribing;

- stepwise pharmacological management of symptoms, typically consideration of simple analgesia (eg paracetamol/acetaminophen) or topical NSAIDs first-line; secondly oral NSAIDs or cyclooxygenase-2 (COX-2) inhibitors depending on patient characteristics; careful consideration of opioids if non-responsive (although some guidelines do not recommend them); adjunctive intra-articular steroids as needed (eg for inflammation);
- review and reassessment;
- consideration of joint replacement surgery for people with pain and functional disability that is affecting quality of life and has not responded to conservative treatment.

However, there is a limitation to the specificity of guideline recommendations.

For example, in relation to non-pharmacological management, none of the guidelines assessed were clear on whether there should be routine referral to allied health professionals such as physiotherapists; whether exercise should be included as part of guided self-management; or the optimal format and frequency of exercise.<sup>48-55</sup>

The lack of clear guidance on certain elements may explain some of the variation both between and within countries as to the extent that guidelines and principles are followed in practice. A 2019 survey of specialists (rheumatologists and orthopaedists) in Spain revealed some of this variation: while most respondents (90%) provided some basic patient education, half of clinicians considered it the responsibility of nurses; 49% said there was no protocol regarding referral from primary care; and only 59% said they made treatment decisions based on clinical guidelines.<sup>56</sup>

Dr Loreto Carmona, Scientific Director at the Instituto de Salud Musculoesquelética (Inmusc) in Spain said: “The problem is that the guidelines are for rheumatologists and usually primary care physicians and orthopaedic surgeons and physical therapists are not aware of them.”

In our interviews, professionals described challenges in guideline adherence arising from a lack of knowledge and awareness among both healthcare professionals and patients, limited availability of supportive programmes or staff (in particular physiotherapists and other allied health professionals), and culture and systems barriers.

Professor Dreinhöfer said that lack of adherence to guidelines from general practitioners (GPs) was an issue, which may reflect a greater need for education. “We see a

lot of patients with OA pain that have already received high dose opioids and opioid plasters [in primary care], which is a little surprising and not really the standard of our guidelines.”

He also pointed to a lack of sufficient focus in medical training on OA, and of ongoing education to keep up with the latest evidence. He said doctors spent about 1% of their education learning about osteoarthritis, but around one third of GPs’ patients had the condition. “There is obviously a discrepancy between 1% education but 30% population,” he said.

In a similar vein, Professor Berenbaum from France added: “Sometimes the education of the physical therapists needs to be updated on the new evidence. For example we know now that massages are not really effective for patients with OA but active treatment is and this kind of message should be updated.”

Initial diagnosis can also be a barrier in some systems. Lotta Håkansson said of Sweden: “We know that a lot of people have to wait for a very long time to get the right diagnosis, especially women in old age. When you are in care and get diagnosed, our experience is that you get rather good help. It’s getting in there that could be the problem.” She put this delay down to lack of knowledge of OA in primary care in some parts of the country.

Professor Krysia Dziedzic, Director of the Impact Accelerator Unit, NIHR Senior Investigator and Professor of Musculoskeletal Therapies at Keele University in the UK, has researched the challenges of implementing guidelines and has worked to implement NICE guidelines in primary care in the UK, via a primary care nurse-led programme of support. Her research supports the need for training



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Dr Loreto Carmona , Scientific Director, Instituto de Salud Musculoesquelética, Spain

for healthcare professionals in delivering care in line with guideline recommendations.<sup>57</sup> She adds, “Without a model for how, when and by whom specific OA-related therapies are provided, there is a high risk that some components of care will be neglected.”

**Effective non-pharmacological support programmes exist – but not everyone can access them**

“The two things that are most effective we have few resources for: muscle strengthening and weight loss.”

*Professor Philip Conaghan, Director, Leeds Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds, and Deputy Director NIHR Leeds Biomedical Research Centre, UK*

Holistic non-pharmacological approaches are central to management and known to work. Systematic review of 62 global studies demonstrated that self-management programmes delivered by healthcare

professionals, which educate patients about exercise and how to manage their pain, improved quality of life in knee OA.<sup>17</sup> However, current guidelines lack detail on the best approach to these programmes, and the level of support offered varies substantially.

Among our focus countries, Sweden stands out in its delivery of non-pharmacological support. Across the country people with OA can be referred to a national supported self-management programme (Better Management of Patients with OsteoArthritis, or BOA).<sup>58</sup> Physiotherapists and occupational therapists run the programme and educate patients in small groups about the disease and symptom management. Participants also have sessions about living with OA delivered by other people with OA. Participants are given the option of a one-to-one session with the physiotherapist to introduce them to an individualised exercise programme, followed by exercising as part of a supervised group class over 6-8 weeks, or by themselves at home.

A national registry measures the results of the programme, and the proportion of patients who have attended before consideration for joint replacement is audited as a national quality marker. A study of 9,800 patients showed that 97% attended education sessions and 82% attended the individualised exercise programme.<sup>59</sup> An analysis of over 44,000 participants found that three months after taking part they reported reduced pain frequency, reduced use of painkillers and increased physical activity compared to baseline levels.<sup>60</sup> The pain reduction was still present a year later, and the proportion of people taking sick leave as a result of their OA had reduced from 12-14% to 5%. The programme can also help to delay surgery. An investigation of a subset of 400 patients who were on a waiting list to see an

orthopaedic surgeon found that 65% were satisfied with the BOA programme and no longer wanted to see a surgeon.<sup>59</sup> Professor Dziedzic from the UK supports this: “A high quality exercise approach for those with severe pain can mean patients choose not to have surgery [because they] have relief. I think the myth is that in all cases if you’ve got severe symptoms the only route is surgery.”

Professor Rolfson said: “This programme [Better Management of Patients with Osteoarthritis] is really well-functioning in Sweden. One could wish that it would reach even more patients in the early stage of OA, but it is a nationwide programme now and well accepted as the first line of treatment for patients with OA of the hip and knee.”

“I think OA is like any other major health problem like diabetes and heart disease. You really need to educate people in order to have them manage their symptoms as well as possible.”

In the UK, a similar programme involving exercise, education and self-management strategies, ESCAPE-Pain, was found to provide good return on investment for treating chronic knee pain by the national body responsible for public health, Public Health England.<sup>61</sup> Their analysis found that putting someone on the programme resulted in an estimated net saving of about £1,310 per patient for the health service (a return of just over £5 for every £1 spent). A separate study found that delivering the programme in UK leisure centres (government-funded activity facilities) was “feasible, safe, improves clinical outcomes, acceptable, sustainable and nurtures an exercise habit”.<sup>62</sup> However, it is not yet available nationally.

Professor Woolf said: “We developed a return on investment tool to enable



**I think OA is like any other major health problem like diabetes and heart disease. You really need to educate people in order to have them manage their symptoms as well as possible.”**

Professor Ola Rolfson, Professor of Orthopaedics, University of Gothenburg, Sweden

localities to see how it would be cost effective for them to implement, and as a result it is now being rolled out in a few places and it is an NHS priority to use it.”

However, Neil Betteridge, independent patient advocate living with OA and former CEO of Arthritis Care, sees the UK’s failure to adopt this type of supported self-management programme more widely as a missed opportunity. “It was a lack of priority on [the] side of [the] healthcare system that failed to take the opportunity to invest to save. The UK system just didn’t buy in like they did in Sweden.”

Spain, France, Germany and Italy do not have national self-management programmes, although physiotherapists are involved in the treatment of OA.

“Non-pharmacological interventions are the basis of osteoarthritis management irrespective of the severity. There are some [self-care and exercise programmes in Spain] but they are hospital area-based and single investigator programmes and these are unfortunately not mainstream, and there is no national plan to develop them as a large-scale population intervention,” said Dr Castro-Domínguez.

Access to physical therapy programmes in France is also limited. “We do not have standardised physical programmes for these patients [in France]. I think that this could be implemented, if the level of awareness of the Ministry of Health administration was higher, because it needs money,” said Professor Berenbaum.

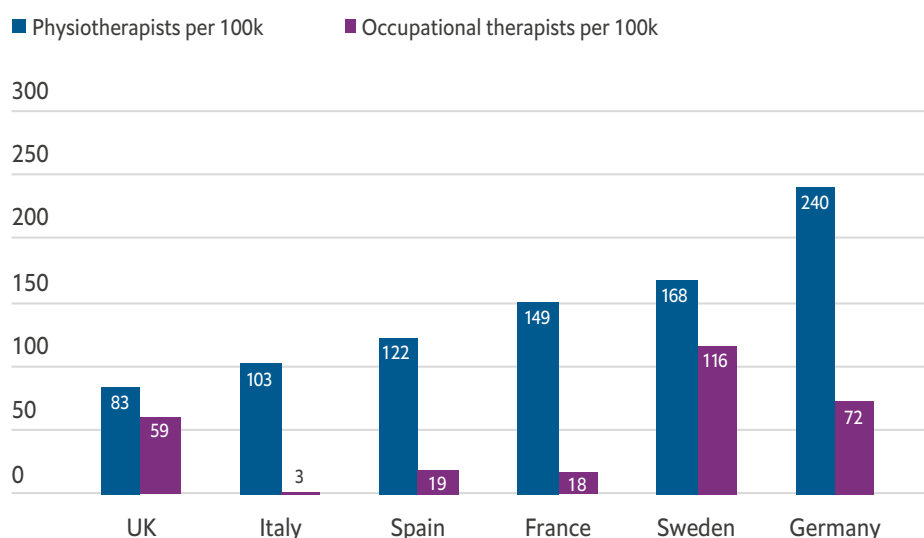
Professor Dreinhöfer says access to physiotherapy in Germany is limited by how much insurance companies are willing to pay for referrals. “That limits the prescription of physiotherapy and everything else—they will usually get one prescription for physiotherapy for three months. Which is obviously much too low.” A 2018 study found that physical therapies were prescribed for 43% of people with OA in Germany, with older people less likely to be prescribed them.<sup>63</sup>

Tiziana Nava, physiotherapist and lecturer at the University of Milan, and past member of the EULAR Standing Committee of Health Professionals in Rheumatology, stated that the

best care programmes for people with OA in Italy are post-surgical rehabilitation programmes. She noted that: “Prevention programmes are not standardised and delivered on a national basis by the [national health service]. Regions are autonomously delivering rehabilitation programmes to their population, including providing proper information and education on health and wellbeing.”

Another factor which affects the ability to provide these programmes is the availability of allied professionals such as physiotherapists and occupational therapists to lead and be involved in care. This varies markedly by country according to reports from professional societies (see Figure 6). Numbers of physiotherapists in the six countries studied vary from a low of 83 per 100,000 people in the UK to a high of 240 per 100,000 in Germany.<sup>64</sup> Sweden leads the pack on availability of occupational therapists with 116 per 100,000 and Italy trails behind with 3 per 100,000.<sup>65</sup>

**Figure 6**  
Number of physiotherapists and occupational therapists per 100,000 in the focus countries



Source: World Confederation for Physical Therapy 2020 data; Council of Occupational Therapists for the European Countries 2020 data



## Patient education is also a priority

Better patient education is also key to making the best of treatments on offer. “In very prevalent diseases, prevention is more important than any other thing. Patient education at a public health level for me is a number one priority,” said Dr Carmona.

Dr Castro-Domínguez added: “In addition to the benefit of a multidisciplinary non-pharmacological approach, having access to individually tailored high-quality information empowers patients to deal better with their disease [and] ultimately [they] require less interventional medical treatment.”

Education was also central for Professor Dreinhöfer. “First of all I would recommend educating patients and doctors on a step-wise approach to treating OA. Well-educated patients have a good choice to find the right treatment,” he said.

Professor Conaghan highlighted one of the commonly held misconceptions about OA: “Poor community understanding of arthritis is a big part of the problem. The consensus is, ‘I’m getting sore [so] I’d better stop moving’ whereas they are probably going into a vicious cycle of not moving, muscle loss and more pain. We have to keep people active.” This lack of understanding that exercise is helpful for pain can lead to people becoming less active, resulting in more pain and stiffness, and exacerbating comorbidities.

A review of patients’ information needs about OA concluded: “Patients desire more information regarding the diagnosis of osteoarthritis, its impact on daily life and its long-term prognosis. They want more information not only about pharmacological management options, but also non-pharmacological options to help them manage their symptoms.”<sup>66</sup> This is notable, as it counters



**Poor community understanding of arthritis is a big part of the problem. The consensus is, ‘I’m getting sore [so] I’d better stop.’**

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the perception that people with OA are only interested in medication options and surgery.

Several doctors commented that patients were reluctant to engage in non-pharmacological treatments such as exercise or weight loss. This perception may be why patient representative Ms Taylor said: “I think a bit of patient blaming goes on with OA, in a way it doesn’t with some of the other conditions.”

“I know of women in particular where they are told to go away and lose weight but they are struggling with exercise [because of pain] and get more depressed which makes them eat more or drink more... it’s providing some sort of support rather than just blaming the patient.”

## Pharmacological management options are limited and do not always relieve pain

**“We don’t have good enough symptomatic treatment for quite a lot of the population with OA at the moment.”**

*Professor Ola Rolfson, Professor of Orthopaedics, University of Gothenburg, Sweden*

In practice, pharmacological therapy is often the main symptomatic treatment offered. However, comorbidities such as cardiovascular disease that are common in people with OA can limit people's options. Available treatments are also not intended for long-term use.

Guidelines highlight the need for consideration of comorbidities and the adverse effect profile of analgesic drugs when prescribing. Some recent guidelines have downgraded the use of simple analgesia because it is considered relatively ineffective, leaving NSAIDs as first-line pharmacological treatments.<sup>54,55</sup> However, NSAID use carries risks of gastrointestinal, cardiovascular, and kidney side effects, and these increase with patient age.

As a result the Osteoarthritis Research Society International (OARSI) guideline, for example, states that for patients with frailty or cardiovascular disease NSAIDs are not recommended.<sup>54</sup> This is of particular significance given that up to a third of people with OA have cardiovascular disease and up to half may be diagnosed with frailty or pre-frailty.<sup>13,67,68</sup> When prescribing NSAIDs in patients with gastrointestinal conditions, the OARSI guideline recommends giving proton pump inhibitors to counteract the risk of stomach irritation and ulcers.

When prescribed, guidelines are unanimous in advising using NSAIDs at the lowest dose and for the shortest duration of time, usually in combination with prophylaxis against stomach irritation and ulcers.<sup>51-55</sup>

"We have a lot of elderly patients with comorbidities—hypertension, heart failure, diabetes—where actually you can't really prescribe any NSAIDs. Then you have one weapon less in your arsenal," said Professor Rolfson.

For people whose pain does not respond to NSAIDs, or who cannot be treated by NSAIDs, opioids are sometimes considered. However, prescription of opioids for refractory chronic pain is controversial because of the risk of dependency. Recommendations about their use in OA vary across guidelines. OARSI guidelines give a strong recommendation against the use of opioids (oral or transdermal) not only on account of the dependency risk but also lack of evidence of benefit.<sup>54</sup> UK, Italian, German and French guidance allow consideration of their use, but recommend that weak opioids should be preferred if they are to be used, and that they should be used for the shortest duration possible.<sup>51-53,55</sup>

Despite these recommendations, an analysis of 2017 data from the Adelphi DSP found opioid use was reported by 32.8% of people with OA, ranging from 25.5% of those in France to 46.1% of those in Spain.<sup>11</sup> Interestingly, despite finding even greater variability in opioid use (from 1.8% in Italy to 54.5% in France) an earlier study (the NHWS) found that quality of life scores remained fairly consistent across the countries and did not correlate with levels of opioid use.<sup>22</sup>

Other therapies have a more minor role, which varies from country to country. There is a lack of consensus on whether the dietary supplements glucosamine and chondroitin offer any potential benefit in remodelling the cartilage. They are currently not recommended in the UK or Germany<sup>51,52</sup> but are options in French and Italian guidelines.<sup>53</sup> <sup>55</sup>The NHWS found use of these supplements was lowest in the countries where they are not recommended (0.4% of OA patients in the UK and 0.5% in Germany) and highest in France (8.8%) and Spain (14.3%).<sup>22</sup> Meanwhile intra-articular injection with hyaluronic acid is not reimbursed by the German or French insurance systems but is nonetheless reported



to be popular and widely used. Its use is not recommended in the UK.<sup>51</sup>

“The [French] rheumatologists consider [that] patients are satisfied by this kind of injection and so this is quite [frequently] prescribed,” said Professor Berenbaum. “Even if we know that a big part of the effects of hyaluronic acid is due to the placebo effect. Maybe the activity of the compound adds to it but the placebo effect by itself is high. So on the pragmatic point of view, for the patient there is an effect and that is what the doctor is looking for.”

Overall, Professor Rolfson from Sweden said that while patients could access “quite good modalities for early stage OA,” such as self-management programmes, the problem was for patients in later stages. “When NSAIDs are not enough, and there are a lot who cannot tolerate NSAIDs. This is an unmet need in terms of pain relief.”

Professor Berenbaum also spoke of the limited treatment options: “The limitation and unmet need is not in the healthcare system. It’s mainly due to the fact we do not have the treatments in order for the patients to reach their expectations.” He pointed out: “There are not so many options—once you have the NSAIDs, then what else?”

Dr Carmona echoed these frustrations: “What we have available is not something that really works—basically it’s painkillers.”

### **Joint replacement surgery rates vary and waiting lists can be long**

There is broad agreement across guidelines that joint replacement should be considered for people with pain and disability that has not responded to conservative treatment. However, rates of joint replacement vary widely between the EU countries studied, and the rates do not clearly correlate with

**Table 1**

Joint replacement rates contrasted with OA prevalence in 2017

Hip OA prevalence (%)	Hip replacement rates (per 100k)	Knee OA prevalence (%)	Knee replacement rates (per 100k)
1. Sweden 1.61%	1. Germany 309	1. Italy 8.45%	1. Germany 223
2. Germany 1.49%	2. France 248	2. Germany 8.42%	2. France 175
3. Italy 1.42%	3. Sweden 240	3. UK 7.66%	3. UK 145
4. Spain 1.42%	4. Italy 183	4. Spain 7.63%	4. Sweden 132
5. UK 1.37%	5. UK 181	5. France 7.43%	5. Spain 130
6. France 1.35%	6. Spain 116	6. Sweden 6.10%	6. Italy 124

Source: OECD 2017 data; Global Burden of Disease Study 2019 data, Institute for Health Metrics and Evaluation

the countries' prevalence of OA. Germany performs by far the most replacement operations for hip and knee, and Spain some of the lowest (see Table 1).<sup>6</sup>

Professor Dreinhöfer was one of the authors of detailed indication criteria for referral for knee replacement surgery in Germany, published in 2017.<sup>69</sup> Of the German joint replacement figures (which are the highest among our focus countries) he said, "That might be an overtreatment compared to the other countries or the other countries might be undertreated. We don't know—as long as we have [no understanding of the indication criteria that were used] we can't really say." He called for better adherence to the indication criteria among clinicians.

He added: "In many countries patients do not have access to joint replacement in an appropriate amount...There are a lot of people that would really benefit from a

procedure but will never get access to it. In Germany, some people get access who do not need it, so they might take a risk that is not necessary. So both systems could improve." He also adds that while some patients may have surgery too soon, there are still "quite a lot of patients that are completely kept away from the surgeon and should have had the operation earlier and are really handicapped and limited because they were not transferred at the right time."

Despite Spain's lower joint replacement rates, Dr Carmona said that "At the hospital level, the access to replacement joints is good; it is not a problem. If you need to have a joint replacement, you will get it." She also alluded to a lack of consistency in how indication criteria are applied. "The main problem is when [GPs] pass the patient too early to the orthopaedic surgeon, then the patient generates expectations that are not [always met] because the process will take time."

Some variation in rates may be due to patient factors such as comorbidity and patient preference, as well as health professional views. Discussions between a multidisciplinary group in the UK showed that not all professionals agreed that patients with knee OA needed to have tried all non-surgical options before referral, as this risked ignoring patient choice.<sup>70</sup> There was also disagreement on how to manage patients with non-responsive severe symptoms who were strongly against having surgery, with some preferring to go with the patient's wishes and others considering they may benefit from a secondary surgical opinion.

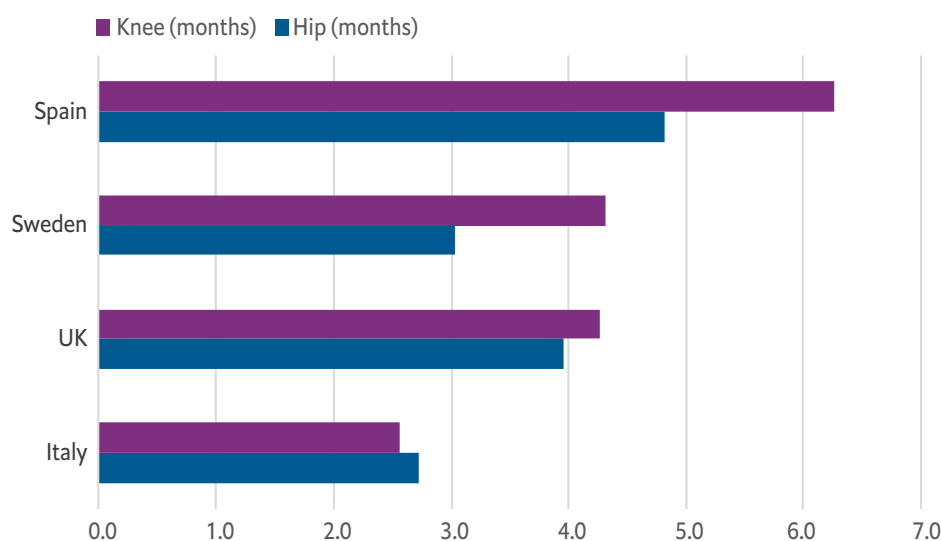
A UK study of 217 patients referred for surgery found that by 12 months half had not undergone surgery.<sup>71</sup> For just over one-third it was due to the professional decision to continue management without surgery, 16% remained on the waiting list, and for roughly 20% it was due to patient factors. These included the patient not feeling ready (10%), other personal reasons (2%), comorbidity

(4%), being considered too young for surgery (3%), and needing weight management (1%). A further 10% of those not operated on were referred for physiotherapy and 3% for exercise. Notably only a third of those referred for surgery had seen a physiotherapist previously, and a third had tried exercise.

Waiting times for joint replacement vary widely across our focus countries, with Spain typically having the longest waiting times followed by the UK, and Italy and Sweden the lowest (see Figure 7).<sup>72</sup> National data on waiting times is not collected in Germany and France, which was confirmed for France by Professor Berenbaum, who said there were no waiting lists. UK studies indicate that most people on waiting lists for joint replacement had relatively high levels of pain (average pain scores of 6-7 on an 11-point scale, where 0 represents no pain and 10 worst pain).<sup>71, 73</sup> Over half (56%) reported constant pain.<sup>71</sup>

Studies from the UK and Spain observed that waiting times for surgery were no shorter for

**Figure 7**  
Waiting times for elective joint replacement surgery



Source: OECD 2019 data (except UK data, which is for 2018)

people with more severe pain and disability than for people with less pain and disability, and called for better prioritisation.<sup>73, 74</sup> The guidelines we assessed did not outline any approaches for prioritising patients for surgery once referred.

### Covid-19 has further lengthened waits for joint replacement

“When you know I’m going to get rid of pain because I’m going for surgery, then you get this message, ‘Sorry, you’re going to have to wait another half year, or another year maybe’, that’s very difficult.”

*Lotta Håkansson, Chair of the Swedish Rheumatism Association (Reumatikerförbundet), Sweden*

The covid-19 pandemic has delayed elective joint replacements in many countries. In one orthopaedic centre in Italy, no elective joint surgery was performed during April 2020, compared with an average 100 joint replacements per week throughout 2019.<sup>46</sup> In Sweden, Professor Rolfson reported a reduction of about 40% to 50% in joint replacement in 2020.

Professor Conaghan warned that waiting times for joint replacement in the UK could hit two years as a result of a widespread shut-down of elective surgery.

In France, Professor Berenbaum said, “I know that many patients had to postpone their surgery because with covid the hospitals had to be re-organised. Hopefully for the second wave the impact was much less so.”

In Germany, Professor Dreinhöfer reported that insurance data has shown a 15%

reduction in total hip replacements between January and October 2020 compared to the same period in 2019.

### Some people do not achieve complete pain resolution even with surgery

Joint replacement gives a successful outcome for many people with OA who have not responded to other treatments. However, around 1 in 5 patients still have pain up to five years after total knee replacement.<sup>75</sup> Outcomes for hip replacement are slightly better, with around 1 in 10 experiencing long-term pain.

Professor Conaghan said: “Hip replacement has been a very successful operation for a lot of people and lasts a good 25 years now, and so long as you have that over age 70 you’ve got a pretty good outcome. For knees the outcomes haven’t been quite as good in terms of outcome of the operation and longevity, so knees are often seen as a bigger problem.”



**We know 20% of the patients who have knee replacement will not be satisfied because of chronic pain. Even after total knee replacement, many patients keep on having pain and we do not know why and we are not able to today to know [in] advance the patient who will have pain.”**

Professor Francis Berenbaum, Professor of Rheumatology at Sorbonne University, Head of the Department of Rheumatology at AP-HP Saint-Antoine Hospital, team leader INSERM CDR Age Related Joint Diseases and Metabolic Disease Institute, France

Professor Berenbaum agreed that knee surgery was “much more problematic” than hip replacement. “We know 20% of the patients who have knee replacement will not be satisfied because of chronic pain. Even after total knee replacement, many patients keep on having pain and we do not know why and we are not able to today to know [in] advance the patient who will have pain. If we had this information we would say to the patient, ‘It’s not for you.’”

“Sometimes we consider that it is time for surgery for knee replacement but the patient comes back and says ‘my pain is still here and what can we do now?’, and we do not have a response.”

### Patient journeys differ markedly and may contribute to treatment variation

A wide range of health professionals can be involved in the care of people with OA, and this can vary by country. For example, in some countries rheumatologists treat OA, but in others they only treat inflammatory arthritis.

Based on our interviews, it was clear that which professional a person with OA sees first, who they get referred to and how, differs across our six focus countries. While many people with OA start their treatment with a GP in primary care, this is not always the case:

- **Sweden:** people can access physiotherapy directly, but most will see their GP first. The GP will then refer to the physiotherapist or the self-management programme.
- **UK:** GPs offer advice on lifestyle management and prescribe painkillers, and may refer patients to physiotherapy services. The UK has rolled out a ‘first practitioner’ service where patients

can access a physiotherapist or nurse in primary care, who will assess, give advice and signpost the patient to appropriate services, including orthopaedic surgeons if joint replacement is under consideration.

- **Germany:** patients can see a GP or go directly to an orthopaedic specialist. The specialists operate outpatient clinics and offer a range of non-surgical treatments, from drug prescription to joint injection. Some patients are referred by their GP directly to orthopaedics for surgery.
- **France:** patients are likely to be referred by their GP to a rheumatologist. They are only referred to an orthopaedic surgeon if joint replacement is under consideration.
- **Spain:** patients see their GP first. Referral is likely to be to an orthopaedic surgeon, with a smaller number being referred to a rheumatologist or physiotherapist.
- **Italy:** GPs manage patients with OA. The patient is referred to an orthopaedic surgeon if joint replacement is under consideration. They can choose to see a specialist privately. In some areas, patients may be referred to physiotherapists or occupational therapists for physical therapy or a programme of rehabilitation.

These different pathways may explain some of the variations in treatment across Europe. There may also be cultural influences, for example, whether people expect to ‘shop around’ for treatments, whether they expect to be offered pharmacological treatments or surgery, or whether the culture promotes exercise and outdoor activities.

Each system has its strengths, and comparison of practices across the countries can provide learning opportunities. Professor Dziedzic

has researched comparative care for OA of the knee, looking at best practice markers across four European countries (Denmark, Norway, Portugal and the UK).<sup>76</sup> She said: “The Scandinavian countries were strong at delivering physio and exercise. Because of their healthcare system in Portugal [where there is access to dieticians in primary care], they were good at dietary advice and weight management. In the UK, GPs were good at giving patient information and also the pharmacological approach.”

### **A more coordinated multidisciplinary approach could improve care**

The need to involve a range of healthcare professionals with a range of expertise was a common theme cited by our experts, especially in the context of delivering supported self-management programmes and education.

Dr Castro-Domínguez said: “At the moment, the disease is seen as a surgical disease, and there is a need to onboard professionals such as physiotherapists, psychologists, nutritionists or occupational therapists in the Spanish health system to tackle this from the beginning, and thus avoid surgeries.”

Dr Veronese from Italy said: “We really need a multidisciplinary approach such as in other conditions like cancer. That means a lot of figures are actively involved in the management and follow-up of this kind of patient. For example you have the geriatrician, you have the general practitioner, we have the rheumatologist, the specialist in rehabilitation—everyone can say his or her opinion and this is the best approach.”

Dr Carmona called for “access to physical therapists and psychologists” to treat OA pain. “I think we are going to go into an epidemic

of opioid dependency again like in the United States. It’s just meds, meds, meds and not other things. To have access to physical therapists and psychologists—they really think of pain much better than we do with medicines,” she said.

The involvement of occupational therapy may also be crucial in helping patients adapt to their condition. Occupational therapists Frank Zamath and Azize Kasberg from Germany say that the options for patients can include orthotic devices, assistive technology, and adaptations for home or the workplace. Ms Taylor said that help from an occupational therapist to find practical ways to do things that were difficult because of her condition had been one of the most useful interventions she had received.

However, the range of professionals involved means that there needs to be better coordination, as otherwise there could be a lack of clarity as to who provides oversight of the patient’s management. This is compounded by the high rate of comorbidity among people with OA, who may be under the care of multiple specialities. The high prevalence of OA may mean some professional groups are concerned about being swamped by referrals, with no one professional group keen to take ownership of the condition.

Professor Dziedzic’s research has suggested that “many of the specific gaps in OA care can be at least partly attributed to a lack of care coordination and a purposeful management approach.”<sup>57</sup>

Professor Conaghan said: “The greatest frustration of GPs and other clinicians is not having someone to refer patients to for adequate long-term management. If we sent everyone with [musculoskeletal] joint pain to physio, systems would be overwhelmed.”





Interviewees mentioned a “lack of interest” in OA from GPs; some said rheumatologists only wished to see patients with inflammatory arthritis; that pain clinics had long waiting lists and didn’t accept people with OA; and that rehabilitation specialists “are pretty embarrassed when you send a patient with only OA to them”.

Professor Dzedzic said that once guidelines outlining best practice are in place, health systems need to be flexible as to who leads that care. “I think it’s right that NICE [in the UK] is saying what good care looks like wherever you are. [The important thing is] that you have a service that can be responsive to the patient’s needs, and in one area the community pharmacists are offering the service, in another first contact practitioners, in another area it’s another group of health professionals, as long as the patient has the best support. Most of the time the patient is supporting their own joint health,” she said.

“**Many of the specific gaps in OA care can be at least partly attributed to a lack of care coordination and a purposeful management approach.**”

Professor Krysia Dzedzic, Director, Impact Accelerator Unit, NIHR Senior Investigator and Professor of Musculoskeletal Therapies, Keele University, UK

## Policy agenda and opportunities for change

“[For] more than 20 years we have been trying to convince individual governments, as well as the WHO, to put [musculoskeletal] conditions at the forefront—or at least the appropriate level [commensurate with disease burden], but it is never seen as a dramatic issue.”

*Professor Karsten Dreinhöfer, Professor in Orthopaedics and Traumatology, Charité Universitätsmedizin Berlin and Medical Park Humboldtstraße, Germany*

### Key takeaways

- OA and other musculoskeletal conditions are not prioritised by policymakers as much as more life-threatening conditions, despite their large disability burden.
- Current initiatives by the WHO and European Union may lead to a more positive context for improvement in OA care.
- Economic arguments present opportunities to involve policymakers in tackling the hidden costs of OA.

### Despite its impact there is low awareness and prioritisation of OA

“[Osteoarthritis is] not perceived by our politicians as a medical condition, except in really severe forms.”

*Dr Nicola Veronese, Geriatrician, University of Palermo, Italy*

One might expect that a highly prevalent condition with big costs for individuals and society would attract priority funding, clinical interest and concern from public and policymakers. However, our interviewees cited a lack of prioritisation and awareness as being barriers to improved care, including:

- lack of priority given to OA as a ‘non-fatal’ medical condition;
- poor knowledge about OA, both among healthcare professionals and wider society;
- insufficient funding for care, especially of non-pharmacological treatments and support programmes.

Several doctors told us that OA isn’t seen as a priority, as it is not sufficiently attention-grabbing—people don’t die from it, it mainly affects older people and is seen as an inevitable consequence of ageing. “We all think osteoarthritis is just something we all have to go through. It’s part of getting old,” said Dr Carmona.

Ms Taylor highlighted that OA can be the most troublesome disease to patients with multiple conditions, even if it is not perceived as the most important by their doctors. “You can talk to people who may be in their 40s, really struggling financially and socially, and they have several diseases and the primary ones might be COPD and diabetes that are being taken really seriously... Their general lives are often very restricted by OA and far more than by what might be perceived as the more life-threatening ones.”

Competition with other conditions for funding was a major issue, cited by many interviewees. Professor Berenbaum said: “This is a very big problem in Europe. The funding for implementing [self-management] programmes or research in the field or education in the field—all this is very low. When there is a competition with other diseases which are known to increase mortality like cancer, cardiovascular diseases and diabetes... awareness is so low for OA or any other rheumatic diseases.”

Even within rheumatology, OA is seen as the “poor relation” compared to inflammatory arthritis (such as rheumatoid arthritis), in which care has been transformed in recent decades after the development of disease-modifying immunological therapies. Ms Taylor, who has experience of both rheumatoid arthritis and OA agrees that OA receives comparatively little attention, but can be more disabling. She said: “There is a lack of status given to it although it causes tremendous pain and disability.”

For Dr Carmona, competition between diseases and professions is unhelpful. “We have the rheumatologist here, the GP here, the orthopaedic surgeon here—we are all disconnected because all of us know better. I don’t know in which part is the patient but not in the centre, whatever the law says. It’s like even among them, competing for resources. Why is there this competition?”

Relative to their impact, research into OA and other musculoskeletal conditions is underfunded. For example, it has been estimated that in the UK musculoskeletal conditions cause 11.5% of DALYs, but only receive about 4.5% of research funding.<sup>77</sup> More research will allow greater progress in meeting the needs of people with OA.

Professor Rolfson noted that as well as the need to develop disease-modifying drugs, other areas also need research. “I wish we would have better ways in the early stages to diagnose OA and know more about the progression or the prognosis and risk factors,” he said. “I think OA is not one disease—it would be valuable to have tools to understand what kind of OA it is. And to monitor disease progression and the effect of the treatments that they give patients. That would be really helpful.”

### **OA has not been high on the global policy agenda, but this could be changing**

Musculoskeletal diseases such as OA have not been as high on the global policy agenda as other noncommunicable diseases. While the WHO “recognises that musculoskeletal health conditions are the leading contributor to disability worldwide,”<sup>78</sup> they were not one of the main areas of focus in the WHO’s Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020 (which are cardiovascular disease, cancer, diabetes and chronic respiratory disease).<sup>79</sup>

Similarly, although the UN’s Sustainable Development Goal 3 is to “Ensure healthy lives and promote wellbeing at all ages,” the indicators for the target relating to non-communicable disease (Target 3.4) measuring achievement of this look only at reducing mortality from cardiovascular disease, cancer, diabetes, chronic respiratory disease or suicide.<sup>80</sup>

However, the time may be right for this to change. The recent WHO Integrated Care for Older People workstream aimed to develop “comprehensive community-based approaches to prevent declines in capacity,” including decline in mobility.<sup>81</sup> OA was flagged in its

guidance as one of the conditions leading to the major burden of disability in older people, and the guidance made recommendations around maintaining mobility.<sup>82</sup>

The United Nations and WHO have declared 2021-2030 the Decade of Healthy Ageing, with the aim of enabling older people “to be and do what they have reason to value”.<sup>80, 83</sup> The negative impact of OA on older people’s valued activities suggests that it should feature high on the agenda. Another positive sign comes from the influential medical journal *The Lancet*, which recently established a Commission on Osteoarthritis.<sup>84</sup> A multidisciplinary group of Commissioners has identified priorities and gaps in knowledge, which will be investigated over a two-year period in order to improve OA prevention, management, and policy.

Professor Woolf said pushing the WHO for greater recognition was a current priority, after 20 years of establishing information about the burden of disease. “The Global Alliance for Musculoskeletal Health [a network of national and international patient, professional, scientific organisations around the world]<sup>85</sup> want all countries to have a strategic action plan to deal with prevention and control of musculoskeletal problems,” he said. “We are working with organisations and experts across the globe to develop this along with WHO, with the aim of getting governments committed to respond to the enormous burden of musculoskeletal conditions.”

In Germany, Professor Dreinhöfer and colleagues have also been pressing for more action. “We are glad that the German government has initiated the first WHO meeting on musculoskeletal conditions, which will be a political meeting where the

relevant issues will be addressed with health ministers.” The meeting, originally scheduled for November 2020, has been postponed because of the covid-19 crisis. Professor Dreinhöfer said he hopes it will happen at the end of 2021 or early 2022.

Economic arguments and facts about the cost of the disease were crucial, he added. “[The economic argument] is the angle we are trying to approach with WHO; to bring together data on economic effects of living with musculoskeletal disease. If you just talk about the poor suffering people you will have a lot of sad politicians, but nobody will change [anything].”

Professor Woolf flags the economic cost as an opportunity to highlight the importance of the issue to politicians. “Work loss has a very high visible cost, because in countries with social welfare systems the state pays people who are not able to work, so it’s much more visible, but employers bear the cost with lost productivity. [Musculoskeletal disease] became an area of priority in the UK in part because of the amount being spent on disability benefit, and realising musculoskeletal disease was one of the biggest costs.”

With the trend for increasing life expectancy, the impact of OA is only likely to increase. Life expectancies in all of our focus countries are 81 years and over, with Spain and Italy having the highest life expectancies in the EU in 2018 (83.5 and 83.4 years respectively).<sup>86</sup> This trend for living longer is also impacting people’s working lives, creating the need to work for longer to fund retirement.

Older workers are playing an increasing part in the workforce in all of our focus countries. Germany has showed the greatest increase in employment rates among the 55-64 year age group across all OECD countries, almost

doubling between 2000 and 2018 (from 37.6% to 71.4%).<sup>87</sup> The normal retirement age is also rising across many of our focus countries, with Italy's retirement age set to rise to 71 years, among the highest in the OECD. These demographic and economic factors mean that it is imperative to empower older people to stay healthy for longer. As Professor Conaghan put it: "Being able to keep people at work longer in an ageing workforce is obviously a big issue."

Implementation of effective OA treatment programmes at scale—and public health interventions to reduce or prevent OA—clearly has the potential to reduce cost to society. Better understanding of the wider economic costs, and the potential to reduce them, may be the best way to unlock funding for implementation of better care.

Ms Taylor agreed that presenting evidence of the economic cost of the disease is "one of the only things that helps." She added: "Politicians are more likely to listen to economic arguments if a lot of the workforce are not able to work again, or are having to rely on benefits because of a condition limiting them."

Her thoughts are echoed by Mr Betteridge. "For policymakers to feel motivated to try new actions they need to feel confident that the problem is substantive; that it is also treatable or approachable; and if the approach looks likely to succeed they need to see benefits will accrue from that. One of the things that can and is being done is make the case around invest to save."

He was hopeful that a programme underway from the EU's Office for Safety and Health at Work, Lighten The Load, may bear fruit. The programme is looking at the impact of work-related musculoskeletal disease, including "generating all the evidence around treatment

options, money that can be saved, the impact on society of not doing anything versus the impact of taking action". The programme has highlighted that about three out of five workers in the EU report suffering from a musculoskeletal disease, and that work-related musculoskeletal diseases are the most common work-related health problem in Europe.<sup>88</sup>

"I've been on webinars with members of the European Parliament [who are] now saying what I was saying 20 years ago: look at the size of the problem but there are simple things we can do to prevent this, and even if people develop it we can still support them to remain active with simple measures, early access to physiotherapist or whatever. Now at a high level, the EU health system seems to have got it," said Mr Betteridge.



**Being able to keep people at work longer in an ageing workforce is obviously a big issue."**

Professor Philip Conaghan, Director, Leeds Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds, and Deputy Director NIHR Leeds Biomedical Research Centre, UK

## Conclusion

Millions of people in Europe live with OA, and over half of them are in moderate or severe pain. This personal toll translates into billions of Euros of costs for economies, as people are unable or less able to work and need financial and other support. Therefore, the cost of failing to meet the needs of people with OA is high.

Several factors prevent these needs from being met. Supported self-management and exercise programmes can and do help people to manage their pain, reduce their disability and continue living their lives. These programmes have also been demonstrated to give a good return on investment, yet we know that people with OA are not always able to access them. Provision is patchy across Europe and rolling them out more widely could be transformative. To do so would require investment, which is not always forthcoming for this condition.

The lack of disease-modifying treatment and a limited pharmaceutical arsenal for treating pain are also factors. However, it is also important not to allow fatalism to set in, which may discourage patients who would benefit from non-pharmacological treatments. Better education on the management of OA and organising services to bringing together all of the multidisciplinary care options for pain, including psychological support, could help to ensure optimal use of the available treatment options.

While joint replacement surgery is often effective, it is a major surgery and does carry risks, meaning that it may not be suitable for or wanted by everyone. Waiting lists for surgery are already lengthy in some countries, a situation which is being exacerbated by the covid-19 pandemic. In addition, about 10%

to 20% of people continue to have long-term pain after joint replacement.

Lack of investment in OA care and research may reflect the relatively low priority given to OA by policymakers and the public more generally. Despite—or perhaps because of—its wide prevalence, it is seen as a condition of ageing, rather than a disease which affects a wide age range, and can and should be treated.

Pushing the condition up the policy agenda is a prerequisite for change. Work by professional societies, charities and patient representative groups to do this is ongoing. There are signs that this work is having an impact at the European and international level, although there is a danger that the urgent needs of the covid-19 pandemic will push OA and other non-communicable diseases down the agenda.

Patient groups need to continue making their voices heard so policymakers hear the individual stories behind the statistics and understand the impact pain and disability can have on people's lives. These groups can also challenge the perception that only elderly, retired people are affected by OA.

In tandem, professional groups need to continue to gather up-to-date data on the costs of this disabling condition, particularly the 'hidden' indirect costs. Barriers within healthcare systems that need to be addressed range from siloed professional groups to insufficient general understanding of OA and lack of resources in key areas.

Research to improve understanding of the condition and the factors that affect its progression could herald better ways to

diagnose and treat it in future. Better prevention of disease progression, education on self-management, timely diagnosis and appropriate treatment can all help reduce the burden of this painful and disabling disease in Europe.

As population demographics shift to older ages, these issues will become ever more important. This trend and the WHO's Decade of Healthy Ageing could provide the impetus for much-needed change. Policymakers need to grasp the scale of OA's hidden costs and its impact on people's ability to live healthy and productive lives, in order to inform decisions about investment in prevention and treatment.

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# Appendix

## Search strategies and approach to literature review

### Objectives

The literature search aimed to give broad coverage of the best available evidence relating to OA in Europe, including its epidemiology, its burden in terms of impact on patients, healthcare systems, economies and society, also patient needs and access to services.

### Sources

We searched bibliographic databases, including:

- EMBASE (a large biomedical database);
- Cochrane library;
- TRIP database (a secondary bibliographic database);
- NHS Economic Evaluation Database (to 2015);
- smaller, specific sources in the social policy/disability field, such as the King's Fund Library and Social Care Online.

We also used additional methods, including:

- Web searching (Google Advanced);
- searching key websites (eg the Lancet Global Burden of Disease webpage, the International Society for Pharmacoeconomics and Outcomes Research, ISPOR webpage);
- reference harvesting/citation tracking of key reports;
- obtaining additional references suggested by experts.

## Approach to searching

The search was structured around the following questions:

- What is the prevalence and incidence of OA and morbidity from OA in our six focus countries and Europe more broadly?
- What are the challenges from the perspective of patients, healthcare professionals, carers and healthcare providers in addressing the burden of morbidity?
- What are the socioeconomic impacts of the consequences of persistent pain and morbidity in people with osteoarthritis or the consequences for their carers; and what policies could reduce these impacts?

In the searches we focused on:

- English language reports;
- European studies;
- studies with the most robust designs for the questions, such as systematic reviews or large cross-sectional studies for prevalence;
- studies with full publications available where possible;
- studies published since 2010.

## Search strategies and results

Table 2 below summarises some of the key search strategies used across the main databases. Searches were carried out in December 2020.

**Table 2**

### Search terms and sources

Source	Search strategy	Output
EMBASE.com	'osteoarthritis'/exp/mj and 'epidemiology'/exp/mj limited to 2010-2021 and ('cohort analysis'/de OR 'cross sectional study'/de OR 'longitudinal study'/de OR 'meta analysis'/de OR 'systematic review'/de) AND 'human'/de	387 hits
	osteoarthritis:ti AND (morbidity:ti OR disabilit*:ti OR burden:ti OR need:ti OR needs:ti OR impairment*:ti) AND 2010-2020 AND ('cohort analysis'/de OR 'cross sectional study'/de OR 'longitudinal study'/de OR 'meta analysis'/de OR 'systematic review'/de)	180 hits
	osteoarthritis:ti AND ('quality of life':ti OR daly:ti OR productivity:ti OR employment:ti) AND 2010-2020 AND ('cohort analysis'/de OR 'cross sectional study'/de OR 'longitudinal study'/de OR 'meta analysis'/de OR 'systematic review'/de)	137 hits
	'osteoarthritis'/exp/mj AND work:ti AND ('cohort analysis'/de OR 'cross sectional study'/de OR 'longitudinal study'/de OR 'meta analysis'/de OR 'systematic review'/de) 2010-2020	37 hits
	'osteoarthritis'/exp/mj AND ((persistent pain):ti OR (long-term pain):ti OR psycholog*:ti OR mental:ti OR depress*:ti) AND 2010-2020 AND ('cohort analysis'/de OR 'cross sectional study'/de OR 'longitudinal study'/de OR 'meta analysis'/de OR 'systematic review'/de) AND 'human'/de	327 hits
	((impact OR function) NEAR/2 osteoarthritis):ti OR ((support:ti OR welfare:ti OR consequence*:ti) AND osteoarthritis:ti) AND 2010-2020 AND ('cohort analysis'/de OR 'cross sectional study'/de OR 'longitudinal study'/de OR 'meta analysis'/de OR 'systematic review'/de)	48 hits
	osteoarthritis:ti AND (access:ti OR referral:ti OR policy:ti OR policies:ti) AND 2010-2020	37 hits
	'adelphi oa disease specific programme'	6 hits

Source	Search strategy	Output
TRIP Database	(title:osteoarthritis) (title:burden) from:2010 to:2020	38 hits
	(title:osteoarthritis) (title:incidence or prevalence or epidemiology) from:2010 to:2020	296 hits
	(title:osteoarthritis) (title:(unmet needs) or (unmet need) or carer or carers or caregiver or caregivers) from:2010 to:2020	6 hits
	(title:osteoarthritis) (title:morbidity or disability or impairment or depression) from:2010 to:2020	162 hits
	(title:osteoarthritis) ("quality of life") from:2010 to:2020	21 systematic reviews
	(title:osteoarthritis) (title:employment or work or productivity or immobility or mobility or benefits) from:2010 to:2020	207 hits
	(title:osteoarthritis) (title:access or referral or supportive or self-management or policy or policies) from:2010 to:2020	128 hits
	(title:osteoarthritis pain) (title:impact or management or clinic) from:2010 to:2020	194 hits
	(title:osteoarthritis) (title:economic or cost or costs) from:2010 to:2020	129 hits
	'osteoarthritis'/exp/mj AND ('indirect costs':ti,ab OR 'indirect cost':ti,ab) from: 2010 to 2020	109 hits
Cochrane Database of Systematic Reviews	MeSH descriptor: [Osteoarthritis] explode all trees, 2010-2020, CDSR only	47, 0 relevant (none exported)
Social Care Online	osteoarthritis in all fields	18 hits
The King's Fund Library	osteoarthritis key phrase	52, 18 relevant and exported for sifting

In total 2,679 references were identified in the initial searches, of which 2,339 were unique records. Of these, 483 reference were identified as being potentially relevant based on title and abstract, and were further assessed for relevance to the key areas of interest. Additional references and data sources were added during the development of the report as a result of further grey literature searching, reference harvesting, citation tracking and personal communication with experts.

We focused on the most recent studies where possible, and prioritised the inclusion of:

- systematic reviews;
- global or European cross-country programmes or analyses including any of the focus countries;
- cohorts, cross-sectional studies or registry analyses from any of the six individual focus countries: France, Germany, Italy, Spain, Sweden and the UK;
- larger studies;
- full-text publications.

Conference abstracts or publications from outside of the six focus countries were reviewed when they contained applicable information that was not covered elsewhere (for example, new and evolving evidence areas such as the impact of covid-19).

Additional epidemiological data on OA from the Global Burden of Disease (GBD) Study 2019 was obtained from the Institute for Health Metrics and Evaluation (Used with permission. All rights reserved).

## Guideline appraisal

The following English-language guidelines were identified and appraised:

1. Ariani A, Manara M, Fioravanti A, et al. The Italian Society for Rheumatology clinical practice guidelines for the diagnosis and management of knee, hip and hand osteoarthritis. *Reumatismo*. 2019;71(S1):5-21.
2. Bannuru RR, Osani MC, Vaysbrot EE, et al. OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. *Osteoarthritis Cartilage*. 2019;27(11):1578-89.
3. Fernandes L, Hagen KB, Bijlsma JWJ, et al. EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis. *Annals of the Rheumatic Diseases*. 2013;72(7).
4. Jordan KM, Arden NK, Doherty M, et al. EULAR recommendations 2003: an evidence based approach to the management of knee osteoarthritis: report of a task force of the Standing Committee for International Clinical Studies Including Therapeutic Trials (ESCISIT). *Annals of the Rheumatic Diseases*. 2003;62(12):1145-55.
5. NICE. Osteoarthritis: care and management [CG177]. London: National Institute for Health and Care Excellence; 2014, updated 2020.
6. Sellam J, Courties A, Eymard F, et al. Recommendations of the French Society of Rheumatology on pharmacological treatment of knee osteoarthritis. *Joint Bone Spine*. 2020;87(6):548-55.
7. Zhang W, Doherty M, Arden N, et al. EULAR evidence based recommendations for the management of hip osteoarthritis: report of a task force of the EULAR Standing Committee for International Clinical Studies Including Therapeutics (ESCISIT). *Annals of the Rheumatic Diseases*. 2005;64(5):669-81.

English-language appraisal of guideline coverage:

8. Steinmeyer J, Bock F, Stöve J, Jerosch J, Flechtenmacher J. Pharmacological treatment of knee osteoarthritis: Special considerations of the new German guideline. *Orthopedic Reviews*. 2018;10(4):7782.

The reviewed guidelines were therefore Europe-wide, or national guidelines from France, Italy and the UK. Of note:

- German guidelines are available only in German language (the above appraisal by Steinmeyer et al. was reviewed).
- No current Spanish or Swedish guidelines were identified through the search or through discussion with interviewees.

Appraisal and comparison of the above guideline documents were conducted using an adapted AGREE II criteria for the assessment of guideline validity (not all domains included and using broad met/not met evaluation system), and guidelines were evaluated for their coverage of the core components of OA management.



# Economic studies from our focus countries

The tables below summarise findings of studies of indirect and direct costs from our focus countries, identified by systematic reviews and our searches.

**Table 3**

Summary of studies from our focus countries providing per-patient costs

First author, publication year	Country	Year	Type of OA	Direct costs	Annual direct cost per patient (2013 €)	Indirect costs	Indirect costs assessed					Annual indirect cost per patient (2013 €)*	Notes
							Absenteeism	Presenteeism	Formal care	Informal care	Other		
Bushmakina 2011 <sup>24</sup>	France, Germany, Italy, Spain, and UK n= 1,739	2008	Any OA	N	NA	Y	Y	Y	N	N	N	8,350* (T)	Only study quantifying monetary value of presenteeism.
Loza 2009 <sup>34</sup>	Spain n=1,071	2003	Any OA	Y	1,500 (I) (88% of total)	Y	N	N	Y	Y	Y	200 (I) (12% of total)	Older population (average age 71), mostly retired (only 9% working)
Núñez 2007 <sup>35</sup>	Spain n=100	2001	Knee	Y	1,800 (I) (36% of total)	Y	N	N	Y	Y	Y	3,255 (I) (64% of total)	Direct costs do not include hospitalisation or equipment. Includes only patients on waiting list for knee replacement
Leardini 2004 <sup>36</sup>	Italy n=254	2000-2001	Knee	Y	1,300 (T) (43% of total)	Y	Y	N	Y	Y	N	1,700 (T) (57% of total)	
Sabariego 2011 <sup>37</sup>	Germany n=97	2003-2005	NR	Y	1,608* (T)	N	N	N	N	N	N	NA	Direct costs do not include diagnostic tests, specialist visits, or equipment
Rolfson 2012 <sup>38</sup>	Sweden n=2,635	NR	Hip	Y	1,300 (T) (19% of total)	Y	Y	N	Y	Y	Y (disability pension, home modification, transport)	5,600 (T) (81% of total)	Includes patients on waiting list for hip replacement
Hallberg 2020 <sup>39</sup> Ongoing study (BISCUITS) Conference abstract only	Sweden n=489,393 with OA and the same number of controls	2017	Any OA	Y	1,459* (I) across all people with OA (50% of total) 1,492* (I) for people of working age (34% of total)	Y	Y	N	N	N	Y (disability pension)	1,476* (I) across all people with OA (50% of total) 2,878* (I) for people of working age (66% of total)	Limited methodological detail available from this conference abstract
Mellström 2010 <sup>40</sup> Conference abstract only	Sweden n=502	NR	Knee OA and chronic pain		497 (T) (29% of total)	Y	Y	N	N	N	Y (early retirement)	1,218 (T) (71% of total)	Limited methodological detail available from this conference abstract

\* Unless otherwise stated. Values reported in 2011 € values (Sabariego 2011), 2008 € values (Bushmakina 2011, costs converted from 2008 USD using mid-year historical exchange rates from xe.com), or 2017 € values (Hallberg 2020). T total costs incurred by a person with OA (no comparison versus a control group), I incremental costs compared to a non-OA control group, Y yes, n number of participants, N No, NR not reported, NA not applicable

**Table 4****Studies on the national level economic impact of OA in focus countries**

First author, publication year	Year(s) of analysis	Direct costs assessed	Annual direct cost	Indirect costs assessed	Annual indirect cost	Notes
Salmon 2019 <sup>32</sup> France Symptomatic knee and hip OA (n=878, average age 64.7 years)	2008-2012	All costs incurred by the National Health Insurance System, private supplementary health insurance, and by patients. Includes costs for comorbidities in OA patients.	€1.7bn (85% of total)	Self-reported work absence quantified using GDP per capita	€0.3bn (15% of total)	Number of days of absence not reported. The study found that much of the direct cost was attributable to comorbidities. Drugs accounted for most of the direct costs (>50%), followed by hospitalisations.
Bertin 2014 <sup>41</sup> France OA of the hip and knee (n=18,976 in the community; 90,946 who were hospitalised for surgery, and 45,622 who received rehabilitation in hospital taken from nationwide care databases; average age NR)	2009-2010	Community costs (GP visit and drugs) and hospital care costs. Did not include costs for visits to physiotherapists or rehabilitation specialists, or outpatient visits to rheumatologists or orthopaedic surgeons. Includes global costs for OA, ie including OA costs and costs of managing comorbidities	€3.5bn	NA	NA	Includes global costs for OA, ie including OA costs and costs of managing comorbidities. Care of OA was estimated to be about 2-3% of the total disease management costs for the healthcare system.  Most of the costs (two-thirds) were associated with hospitalisation for surgery.
Le Pen 2002 <sup>42</sup> France Any OA (Nationwide data used, covering an estimated 4.6m patients with symptomatic OA)	2001-2003	Outpatient and inpatient visit costs and medication related to OA	€1.6bn (90% of total)	Physician-prescribed work absence	€0.18bn (10% of total)	Direct costs represented 1.7% of total French health insurance system costs. OA was the cause of over 5m days of absence each year, representing 2.6% of all sick leave days
Loza 2009 <sup>34</sup> Spain Symptomatic OA of the hip or knee (n=1,071)	2003	Professional time, imaging and laboratory tests, all medications, hospital admissions, help at work and home, and self-care, adaptive aids, devices, assistive household equipment, and transport for receiving care	€4.1bn (86% of total)	Absenteeism, permanent work disability, costs of housekeeping help	€0.6bn (14% of total)	Total of €4.7 billion equates to 0.5% of GNP (which is a measure of the output of a country's residents regardless of the location of the economic activity). Indirect costs may be low due to sample being older (average 71 years), most of whom were retired or homemakers, with only 9% of participants still working. Help at work and home (other than help with housework) were classified as direct costs, and represented the largest single direct cost (33%).
Mellström 2010 <sup>40</sup> Sweden Knee OA and chronic knee pain (n=502)	NR	Knee pain-associated hospitalisations, visits to and consultations with healthcare professionals, and drugs	€0.16bn (29% of total)	Absenteeism, early retirement	€0.40bn (71% of total)	Total €0.56bn. Only included people aged 56 to 84 years. Limited detail of methods and results available from this conference abstract.
Merx 2007 <sup>43</sup> Germany Any OA (Some data national-level data and some from an outpatient data source with n=600,000 patients)	2002	Visits to healthcare professionals, drugs, ambulatory care, hospitalisation and inpatient care, use of prevention/rehabilitation facilities	€7.2bn (61% of total if using GVA to measure productivity loss)	Absenteeism, disability, early retirement	€4.64bn loss of gross value added (GVA)* (39% of total)  €2.95bn in terms of average wages lost	Healthcare spending on OA for 2002 was second only to spending on high blood pressure. Indirect cost to the economy was calculated in two ways: the impact of downtime costs based on average wages, and the impact on productivity based on GVA. The two are not summed as they both represent productivity loss.  The totals do not include the unemployed/economically inactive population.

\*GVA is a way of measuring economic productivity, it is the value generated in the production of goods and services within the country. It is calculated as the gross domestic product (GDP) plus subsidies on products minus taxes on products, and tends to be slightly lower than GDP. GNP gross national product, GVA gross value added, NA not assessed.

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