

# The older worker with osteoarthritis of the knee

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**Background:** Changing demographics mean that many patients with large joint arthritis will work beyond traditional retirement age. This review considers the impact of knee osteoarthritis (OA) on work participation and the relation between work and total knee replacement (TKR).

**Sources:** Two systematic searches in Embase and Medline, supplemented by three systematic reviews.

**Areas of agreement:** Probably, although evidence is limited, knee OA considerably impairs participation in work (labour force participation, work attendance and work productivity).

**Areas of uncertainty/research need:** Little is known about effective interventions (treatments, work changes and policies) to improve vocational participation in patients with knee OA; or how type of work affects long-term clinical outcomes (e.g. pain, function and the need for revision surgery) in patients with TKRs. The need for such research is pressing and opportune, as increasing numbers of patients with knee OA or TKR expect to work on.

**Keywords:** gonarthrosis/employment/occupational/management/work participation

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By 2050, 30% of the European population will be aged >65 years. Demographic change is generating an imperative to keep people in work to older ages, especially in countries where reproduction and immigration rates are low. In response, western governments have developed policies to boost labour force participation among older workers. The UK government, for example, is raising the state pension age, and has legislated to remove the normal default retirement age and combat disability discrimination and age discrimination in the workplace.<sup>1</sup> At the same time, increasing numbers in the UK (perhaps 6.1 million people<sup>2</sup>) seem intent on working longer, to build savings

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for retirement in the face of personal indebtedness, higher costs and taxes, and diminishing returns on investments and pensions.

One major threat to full employment at older ages is the incapacity arising from large joint osteoarthritis (OA). Knee OA becomes progressively more common with age, meaning that an ageing workforce will contain a greater proportion of people with joint pathology. Additionally, the proportion with joint prostheses is rising, in part because of ageing and in part because of more aggressive approaches to treatment. Dixon *et al.*<sup>3</sup> reported a doubling in the age-standardized rate of primary knee joint replacements and a tripling in that of knee replacement revisions in England and Wales between 1991 and 2000. More recently, during 2010–11, some 92 000 primary replacements and 5800 replacement revisions were performed, up over 4 years by 41 and 77%, respectively. One-third of primary replacements occurred in patients aged <65 years,<sup>4</sup> a trend that is growing. In one US study,<sup>5</sup> for example, rates of total knee replacement between 1990 and 2000 rose 4- to 5-fold among 45–49 year olds, as compared with 1.5- to 1.7-fold among patients aged >65 years. Increasingly, this developing healthcare technology is being offered to younger patients, many of whom expect to work.

Work may carry an overall benefit to health as well as providing the financial means to support dependants and participate in society, while redundancy and unemployment may cause psychological harm.<sup>6</sup> However, for those in pain and with mobility problems, work cannot be assumed always to be safe and beneficial. Also, certain types of work are likely to be more difficult for those who have knee OA or who have had knee joint arthroplasty, and work incapacity may restrict job opportunity.

This review considers three broad questions:

- (i) To what extent does knee OA limit work participation and cause sickness absence and health-related job loss?
- (ii) Is there any evidence that interventions promote work participation in patients with knee OA?
- (iii) What is known about the inter-relation between work and knee joint replacement? Does surgery improve work participation? And which jobs may safely be done after knee surgery, as judged by long-term clinical outcomes such as joint survival, joint function and quality of life?

These questions are addressed using two targeted literature searches and three systematic reviews. Research challenges and gaps in evidence, which in some areas are extensive, are emphasized throughout.

## Work participation in patients with knee osteoarthritis

Activities like kneeling, squatting, climbing and heavy lifting will undoubtedly be more difficult and uncomfortable for patients with knee OA, and are considered to play a role in the development of disease.<sup>7</sup> It might be expected therefore that sickness absence and job loss from knee OA would be material and greater in those in manual employment than in those whose work is sedentary.

In fact, the matter has been little studied. To inform this part of the review use was made of a systematic review on OA and work participation by Bieleman *et al.* (2011).<sup>8</sup> This focused on OA of knee or hip and 'employment', 'sick leave', 'work participation', 'work changes' and 'work adaptations and 'work transitions'. After screening 1861 abstracts and retrieving 53 full-text articles, 14 reports on OA were finally retained, but of these, only 7 presented data specific to (or preponderantly concerning) the knee. Additionally, a further population study of relevance was identified from a search on work and knee joint surgery described below.

In a nationwide survey of French physicians,<sup>9</sup> 3247 patients with knee OA (mean age of 66 years) were identified, of whom 17% were still working. In this group, two-thirds reported being limited in their current work capacity and one-fifth reported taking OA-related sick leave.

In a Norwegian population-based study of 3266 subjects (median age 45 years), 233 cases of knee OA were identified.<sup>10</sup> Among these patients, after allowing for age and sex, the odds of being out of work were raised almost 2.5-fold and those of taking >8 weeks of sick leave were almost doubled, relative to others without knee OA.

Woo *et al.*<sup>11</sup> reported on 574 patients from Hong Kong with varying degrees of OA or with joint prostheses—82% of cases relating to the knee and 60% aged <70 years. In all, 4.7% reported quitting a job because of their OA, 1.4% had workplace adaptations and 8.7% said that friends or relatives had needed to take leave to care for them. Among those still in paid work (108 subjects), 53% reported taking sick leave in the past 12 months because of their arthritis, at an average of 12.3 lost days per year.

Gupta *et al.*<sup>12</sup> conducted an economic evaluation in a population cohort of 1258 Canadian patients aged  $\geq 55$  years (mean 73 years) with disabling hip or knee arthritis (the proportion with knee complaints was not specified): in all, 2.5% reported not working due to OA, and it was estimated that time lost from employment by participants and their unpaid caregivers accounted for 80% of annual OA-related costs, there being several sources of indirect cost (formal lost work time, lost labour productivity, caregiver time losses, etc.).

Similar findings were reported by Leardini *et al.*<sup>13</sup> among 254 patients with OA knee from Italian rheumatology institutes (mean age of 66 years), 21% still in work. In this study, 2.4% reported discontinuing work because of their knee OA and 2% had changed the type of work they did in the past 12 months. Some 22% of patients had had OA knee-related sick leave over the period (the denominator for this calculation is assumed to be all patients in work).

Sayre *et al.*<sup>14</sup> investigated 'employment reduction' due to OA in 2134 adults with OA (mean age of 62 years) registered on a medical service plan database in British Columbia. Among 453 subjects with knee OA, 36% had quit work entirely and 13% had reduced their working hours because of their arthritis.

In the mini-Finland study,<sup>15</sup> a survey representative of the Finnish population aged 30–64 years, 4% of subjects had physician-diagnosed knee OA and over 70% of these reported a reduced capacity for work.

Finally, the Dutch CHECK (Cohort Hip and Knee) Study is following an inception cohort of subjects aged 45–65 years with pain and stiffness of the knee and/or hip, recruited in 2005. At baseline,<sup>16</sup> 51% reported having a paid job for >8 h/week. At younger ages, work participation rates were similar to those in the general Dutch population, but in 60–64 year olds they were 30–40% lower (those with higher education being relatively protected). In the previous 12 months, 12% of subjects had been on sick leave because of their knee or hip symptoms, a fifth for >3 months. Among those working >8 h/week, 14% had received adaptations from their workplace to help them [including reduction in working hours (38% of those in receipt of help), workplace aids and changes (25%) and modified duties (10%)]; a further 30% would have liked to have had such help. Perhaps as expected, those in paid work reported significantly less pain and stiffness and better function (WOMAC scale) and had better SF-36 physical function scores.

Beyond this, the reports identified by Bieleman *et al.*<sup>8</sup> offer data on job disruptions, absenteeism, reduced working hours, job change and job dissatisfaction; but only in patients with arthritis as whole or hip OA and with no exploration by type of work duties. The evidence base on OA knee and work participation is thus small relative to the significance of the problem in ageing western workforces. This gap in evidence, at first sight surprising, probably arises because the main effects of OA have hitherto been seen after retirement. However, the changing demography in workplaces makes further research in this area both timely and important.

## Interventions to promote work participation

An important neglected area of investigation concerns effective interventions to improve work participation and comfort in patients with knee OA. Recently, the author undertook a systematic review of workplace and community-based interventions to reduce sickness absence and job loss from musculoskeletal causes;<sup>17</sup> although 42 interventional studies were identified in all, including 34 randomized controlled trials (RCTs), none was specific to osteoarthritis.

Observational studies are similarly scant. However, a cross-sectional study by Chen *et al.*<sup>18</sup> encouragingly reported that symptomatic knee OA was significantly less common in workplaces which had supportive employment policies (those allowing job switching and paid sick leave or disability benefits). Longitudinal research is needed to confirm that the apparent benefit did not arise from selection out of work of affected cases; but the study illustrates the scope for research to inform this important area of employment policy.

The review of interventions cited above<sup>17</sup> did not include drug or secondary care treatments. To explore this aspect, a search (Search 1) was undertaken in Medline and Embase (from 1946 to January 2012), combining terms for 'treatment' and knee OA with those for work participation, sick leave, sickness absence, employment and work ability. Although 98 abstracts were screened, only two pertinent reports were found, of which only one claimed a useful benefit.<sup>19</sup> In this unblinded RCT, patients with rheumatic diseases, including 258 with peripheral arthritis (not specific to the knee), were randomized either to care as usual or to a stepped rheumatological intervention which began with diagnosis, pharmacological treatment of pain and depression, joint injections if needed, reassurance and education in self management (with encouragement to remain active and advice on ergonomics and on exercise); in those who failed to improve, this was followed by formal rehabilitation and specialist referral. The relative rate of return to work in the intervention group was 1.58 (95% confidence interval (CI): 1.14–2.19) and the total annual number of 'temporary work disability' days (certificated for sick pay) per 1000 patients was reduced by 26%.

There is a pressing need to expand this very slim evidence base, and to identify effective medical and vocational measures that enhance work participation in patients with large joint OA. In particular, it should be emphasized that extent of work participation is likely to be limited in practice not only by biological factors, such as severity and functional impact of disease, but also by the nature of a patient's work and the scope to adapt their job role to match their residual capabilities

and limitations. Research to demonstrate the feasibility, effectiveness and cost-effectiveness of workplaces interventions to boost work participation would be particularly valuable, but is presently lacking.

## Knee joint surgery and work

Patients who receive a knee arthroplasty may have greater difficulty returning to work if their job is manual, while the heavier joint loading in a manual job may contribute in the long term to a greater risk of failure of the prosthetic knee joint through wear and tear or aseptic loosening. To assess the evidence on these matters, a further search was conducted in Medline and Embase (from 1948 to September 2011, Search 2). This time terms for knee arthroplasty, prosthesis, replacement, implant or surgical revision were combined with those for occupation, employment, job, work or physical activities (e.g. kneeling, squatting, lifting, standing), with supplementary searches on follow-up, long-term outcome and disability. Additionally, a systematic review by Kuijer *et al.*<sup>20</sup> on return to work after hip or knee arthroplasty was considered. These sources yielded seven surgical case series with empirical data, as well as various statements on expert practice that were unsupported by data.

Several small investigations have reported on employment status before and after primary total knee replacement (TKR) in patients aged <60 years at the time of their operation. In one investigation,<sup>21</sup> 41 were employed beforehand and all but one resumed their normal work afterwards; but by contrast, only 1 of 15 unemployed patients took up new work. The odds of unemployment were almost 11-times higher where the surrendered job was manual as compared with non-manual. Jorn *et al.*<sup>22</sup> investigated work status in 162 patients during the 2 years before and the 2 years after primary knee arthroplasty. Among 88 who had been in work pre-operatively, 52 (59%) were still in work at follow-up, whereas among the 74 who were not in work initially, only 9 (12%) had taken up a new job. In a study of similar design, Foote *et al.*<sup>23</sup> followed 109 patients aged <60 years. Some 33% were not in employment prior to surgery. Among the remainder, 82% of those having a TKR or unicompartmental knee replacement resumed work, as compared with 54% of those receiving a patello-femoral replacement. The median return to work time overall was 12 weeks.

These reports provide insight into employment and re-employment rates in patients affected severely enough to require knee arthroplasty. A few other studies have investigated predictors of return to work. A prospective cohort study by Styron *et al.*<sup>24</sup> recruited 162 older patients

who were in work and intended to resume it after primary TKR, and followed them for 6 months. Overall, the median return to work time was 8.9 weeks, although 28% were still off work at 3-month follow-up. Speedier return was significantly and independently associated with female sex, a better preoperative knee physical function score and better mental health. Work resumption was also quicker in the self-employed and those who were more motivated to return, notably among those who expressed a great sense of urgency to return (felt it important to resume work in <1 month). This last group managed to resume work in about half the time that other patients took, and at 3 months were 1.5 times more likely to be working full time.

Several work circumstances also bore upon outcome. A work environment reported by the patient pre-operatively to be 'handicap accessible' favoured a 25% reduction in return to work time, whereas a job that was reported to be physically demanding was associated with a lengthening of ~10–11%. A few patients were receiving workers' compensation and for them the vocational prognosis was markedly worse. Similarly, a small study focusing on patients in receipt of compensation<sup>25</sup> found that, although highly satisfied with their surgery and with improved range of movement and post-operative functional knee scores, only five of 21 people returned to their previous occupation.

A study by Palmer *et al.*<sup>26</sup> considered the factors underlying health-related job loss in a mixed group of 370 patients aged 16–64 years on the waiting list for lower limb surgery (TKR but also total hip replacement, arthroscopy and hip resurfacing). Of these, 27% (95% CI: 22–32%) were unemployed, while 30% (95% CI: 24–35%) of those in work when symptoms first began had quit a job mainly/partly because of the joint problem. Almost three-quarters had not been offered any job modifications to help them cope at work. Risks of health-related job loss were higher at younger ages, with longer duration of symptoms and with greater level of disability. Additionally, non-sedentary employment carried a greater risk [hazard ratio (HR) vs. sedentary 2.7, 95% CI: 1.2–6.1] as did employment by a 'micro'-firm with <10 employees (HR: 1.9, 95% CI: 1.2–3.0). This last outcome presumably reflects the more limited flexibility of small employers to accommodate a health problem through work sharing and allocation to alternative duties.

The systematic review by Kuijer *et al.* found one other report on TKR in which return to work times were compared according to the use or not of guidelines on hospital discharge policy.<sup>27</sup> The guidelines reduced length of hospital stay but did not alter the proportion of patients (81–83%) resuming work within 30 days of admission.

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## Clinical outcome after knee arthroplasty and its relationship to work

While return to work is sometimes assessed in the short term as a measure of the success of surgery on the knee, Search 2 found no empirical data on how the nature of work affects long-term clinical outcomes such as pain, quality of life, function and the need for knee joint revision.

Instead, a few reports were found describing the general advice that surgeons give their patients. Most recommend avoiding intense and/or high-impact activities after TKR,<sup>28</sup> published advice relating to participation in sports (running, waterskiing, football, baseball, basketball, hockey, handball, karate, soccer, racquetball<sup>29</sup> and golf<sup>30</sup>), but data of any kind are sparse. In one small case series, a greater risk of polyethylene failure was reported in individuals who were more active, based on their occupation or retirement status;<sup>31</sup> and in another small study, which matched 26 patients with primary TKR requiring revision with 26 other TKR patients who did not,<sup>28</sup> there was no relation to physical activity since surgery (estimated by questionnaire across both work and leisure and expressed as average MET-hours per week).

The optimum long-term advice to give patients with knee surgery wishing to resume their normal work is therefore moot, there being a dearth of relevant evidence. Further inquiry is important, given the growing number of patients with TKR who are still working or seeking work, and timely since only now are sufficient numbers accumulating who can be assessed at an adequate interval after knee replacement at a young age.

## Conclusions

Knee OA is an important cause of morbidity in later life, set to become increasingly common in the workforce. It is a significant cause of work interference, but evidence on interventions to help such patients remain in productive work, is scant. Nor is much known beyond general principles about how work affects the long-term clinical outcome for a growing number of younger patients with TKR. The management of knee OA has been considerably improved by pharmacological treatments to reduce pain, while surgical interventions can correct altered biomechanics or restore function in severely damaged joints, and physical fitness, physical modalities, education and self-management all have a role to play.<sup>32</sup> By contrast, the vocational aspects of case management have barely been considered to date, and this must change.

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