

## Risk factors associated with reduced work productivity among people with chronic knee pain



M. Agaliotis <sup>†\*</sup>, M. Fransen <sup>‡</sup>, L. Bridgett <sup>‡</sup>, L. Nairn <sup>†</sup>, M. Votrubic <sup>§</sup>, S. Jan <sup>||</sup>, R. Heard <sup>¶</sup>,  
M. Mackey <sup>#</sup>

<sup>†</sup> Faculty of Health Sciences, University of Sydney, Australia

<sup>‡</sup> Physiotherapy, Clinical and Rehabilitation Sciences Research Group, Faculty of Health Sciences, University of Sydney, Australia

<sup>§</sup> Graduate School of Medicine, The University of Notre Dame, Darlinghurst, Australia

<sup>||</sup> The George Institute for Global Health, Sydney, Australia

<sup>¶</sup> Behavioural and Social Sciences in Health, Faculty of Health Sciences, University of Sydney, Australia

<sup>#</sup> Physiotherapy, Ageing, Work and Health Research Unit, Faculty of Health Sciences, University of Sydney, Australia

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### SUMMARY

**Objective:** To determine the burden and risk factors associated with reduced work productivity among people with chronic knee pain.

**Method:** A longitudinal study, nested within a randomised controlled trial (RCT) evaluating the long-term effects of dietary supplements, was conducted among people with chronic knee pain in paid employment ( $n = 360$ ). Participants recorded days off work (absenteeism) and reduced productivity while at work (presenteeism) for seven days every two months over a 12-month period in a study specific diary. Examined risk factors included knee pain severity, occupational group, radiographic disease severity, physical activity, body mass index (BMI), health-related quality of life (SF-12) and comorbidity.

**Results:** Over the 12-month follow up period, 50 (14%) participants reported one or more days off work due to knee problems, while 283 (79%) reported reduced productivity while at work (presenteeism <100%). In multivariate analysis, the only significant risk factor for absenteeism was having an SF-12 Mental Component Summary (MCS) score <40 (OR: 2.49 [95% CI: 1.03–5.98]). Significant risk factors for presenteeism included; reporting an; SF-12 Physical Component Summary (PCS) score <50 (OR: 1.99 [95% CI: 1.05–3.76]), semi-manual labour (OR: 2.23 [1.09–4.59]) or manual labour (OR: 6.40 [1.44–28.35]) or a high maximum knee pain (4–6 out of 10) (OR: 2.29 [1.17–4.46]).

**Conclusions:** This longitudinal study found that among this cohort of people with chronic knee pain, the burden of reduced work productivity is mainly attributable to presenteeism rather absenteeism. This study demonstrated that effective strategies to increase work productivity should focus on reducing knee pain or physical disability especially among workers in manual or semi-manual labour.

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### Introduction

Osteoarthritis of the knee is a common chronic musculoskeletal condition often associated with pain and physical disability<sup>1</sup>. Chronic knee pain is associated with reduced quality of life<sup>2–4</sup>. Previous large population-based surveys have shown over 30% of older people have symptomatic knee osteoarthritis with about half also reporting some level of associated disability<sup>5–10</sup>. With an

ageing population, and the growing trend to delay retirement worldwide, the number of people in the workforce affected by painful knee osteoarthritis will increase<sup>11,12</sup>.

Work productivity losses are typically measured in two ways: as days taken off work (absenteeism) or as self-reported reduced productivity, or performance while at work (presenteeism). There is increasing evidence that presenteeism, rather than absenteeism, is the major contributor to loss of work productivity<sup>13</sup>. However, only a paucity of studies has examined the effects of symptomatic knee osteoarthritis on loss of work productivity.

A large population-based cohort study conducted in Sweden found that a diagnosis of knee osteoarthritis was associated with a twofold increased risk of sick leave<sup>14</sup>. Similar findings were

\* Address correspondence and reprint requests to: M. Agaliotis, Cumberland Campus C42, Room 205, O Block, 75 East Street, NSW 1825, Australia. Tel: 61-2-9036-7322; Fax: 61-2-9351-9278.

E-mail address: maria.agaliotis@sydney.edu.au (M. Agaliotis).

reported in a Norwegian population-based survey<sup>15</sup>. Additionally, in a Finnish survey, 71% of the 227 respondents who reported knee osteoarthritis also reported a reduced working capacity due to health reasons, compared with 24% in the overall cohort<sup>16</sup>. Similar results were demonstrated in four clinic-based surveys. A French national general practitioner survey of 10,295 patients with osteoarthritis found that among patients with knee osteoarthritis 66% reported occupational limitations compared to 14% reported in the general population<sup>17</sup>. A Canadian survey examining employment reduction due to osteoarthritis 57 (13%) of 453 people with reported knee 'arthritis', had 'reduced hours', while 161 (36%) reported 'total work cessation'<sup>18</sup>. The VISK study, conducted in The Netherlands, found 20% of 117 working participants, reported taking one or more sick days, while 80% had a 'hindrance in work' due to knee symptoms 'in the last 3 months'<sup>19</sup>. The Netherlands Cohort Hip and Cohort Knee (CHECK) survey examined the prevalence of sick leave among 493 employed patients with early symptoms of hip or knee osteoarthritis and reported 61 (12%) being on sick leave in the past 12 months because of their knee and/or hip osteoarthritis<sup>20</sup>.

These population and clinic-based surveys had methodological limitations; most were cross sectional studies assessing various measures of absenteeism only and required lengthy recall periods. To date, there has only been one small longitudinal study examining both presenteeism and absenteeism among people with knee osteoarthritis in a prospective manner; the Longitudinal Examination of Arthritis Pain (LEAP) study<sup>21</sup>. Over the three-month follow-up period, changes in joint pain were highly associated with 'days missed work' or 'days of limited productivity' among the 47 working participants. However, the sample size was too small to examine risk factors associated with reduced work productivity.

The objectives of this study were to determine (1) the burden of reduced work productivity (absenteeism and presenteeism) and (2) risk factors associated with reduced work productivity among people with symptomatic knee osteoarthritis over a 12-month follow-up period. Identifying modifiable risk factors for reduced work productivity may allow the implementation of effective preventive workplace strategies and minimize the economic burden associated with chronic knee pain.

## Method

### Design

This longitudinal cohort study was conducted among the participants in a randomised controlled clinical trial, the Long-term Evaluation of Glucosamine Sulfate (LEGS) study (NCT00513422). In total, 605 people with chronic knee pain were recruited to the LEGS study through local and state newspaper advertisements and general practitioner clinics from November 2007 to November 2009 in New South Wales, Australia. The LEGS study was approved by the University of Sydney Human Research Ethics Committee and written informed consent was obtained from all participants.

### LEGS study participants

At baseline all participants were aged 45–75 years, reported knee symptoms for more than 6 months, had knee pain or were taking non-steroidal anti-inflammatory drugs or analgesia for knee pain on most days of the past month and rated their knee pain  $\geq 4$  out of 10 for most days of the past week. Potential participants were excluded if they had: unstable diabetes; rheumatoid arthritis or other systemic inflammatory arthritis; lower limb joint surgery within the last 6 months; corticosteroid injection into the symptomatic knee joint in past 3 months; knee replacement in the symptomatic knee, or planning to have knee surgery in the next 12

months. Potential participants were required to have an X-ray of both knees in a semi-flexed weight bearing position according to a specific protocol<sup>22</sup>. To be eligible, a symptomatically eligible knee needed to demonstrate medial tibiofemoral joint space narrowing but retain more than 2 mm joint space. Follow-up annual assessments were carried out face-to-face with participants at one of the four NSW metropolitan radiological centres and bi-monthly LEGS Participant Diaries were mailed to participants from the period of November 2008 to November 2011.

To be eligible for this embedded longitudinal cohort study, LEGS participants had to report being in paid employment at the baseline assessment.

### Outcome measures

#### Bi monthly LEGS Participant Diary (Fig. 2)

Participants completed a novel one page, 7-day LEGS Participant Diary, at baseline and then posted with study treatment capsules every 2 months over the 12-month follow-up period (Fig. 2). The LEGS Participant Diary collected data on pain and function, medication intake, physical activity, health service use and work productivity.

#### Work productivity

Work productivity was evaluated as:

- 1) Absenteeism (past 2 months): 'How many days off did you have due to your knee problems?'
- 2) Presenteeism (daily): 'Your knee problems may affect your ability to work or perform daily activities. Please estimate your capacity for each day from 0% (unable to do usual work/activities) to 100% (fully functioning in usual role).'

Both work productivity questions were derived from the Work Productivity and Activity Impairment Questionnaire: Osteoarthritis of the Knee or Hip V2.0 (WPAI:OA)<sup>23,24</sup>.

#### Risk factors

Baseline clinic assessment included: height and weight without shoes and with pockets emptied to assess body mass index (BMI). Health-related quality of life was evaluated using the Medical Outcomes Study Short Form 12 Health Survey [SF-12]<sup>25</sup>. The eight health domains are aggregated into two summary measures: the Physical Component Summary (PCS) and the Mental Component Summary (MCS) scores. Both summary scores are population norm-based scores with a mean (sd) of 50 (10). A lower score represents more disability. The SF-12 was further categorized into four groups dependent on final score; 50 or more no disability; 40–49 mildly disabled; 30–39 moderately disabled and 30 or below severely disabled<sup>26</sup>. Co-morbidity was reported using the Self-Administered Co-morbidity Questionnaire (SCQ)<sup>27</sup>. This questionnaire recorded the presence of 12 current medical conditions: high blood pressure, heart disease, lung disease, diabetes, ulcer or stomach disease, kidney disease, liver disease, anaemia or other blood problems, cancer, depression, back pain, and rheumatoid arthritis. Additional scores are given if the participant reported receiving treatment and if this condition limited activities. The scores range from 0 to 36 points, where a higher score indicates more co-morbidity. The co-morbidity score was further categorized into three levels: 0–1 co-morbidities; 2–3 co-morbidities and 4 or more co-morbidities<sup>28</sup>. Knee radiographs were graded according to the Kellgren Lawrence (K/L) scale<sup>29</sup>. Work status classifications included; full-time, part-time, self-employed, unpaid, disabled sick, unemployed, carer, semi-retired or other.

Baseline LEGS Participant Diary (Fig. 2).

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