

Many common diseases are directly linked to **lifestyle factors**, but these are generally **not** the conditions that keep people **out of work**. Instead, common mental health problems and **musculoskeletal disorders** are the **major causes** of **sickness absence** and **worklessness** due to ill-health. **This is compounded by a lack of appropriate and timely diagnosis and intervention.**

1

1



Doorbreek de cyclus van werkplek naar spreekkamer bij lichamelijk zwaar werk

Dr. Paul Kuijper, Bewegingsspecialist, Nederlands Centrum voor Beroepsziekten - Polikliniek Mens & Arbeid
Department of Public and Occupational Health, <https://www.linkedin.com/in/ppfmkuijper/>



2



Amsterdam UMC

Sinds juni 2018 zijn de twee Amsterdamse academische ziekenhuizen AMC en VUmc samengegaan tot Amsterdam UMC met 19.500 collega's.

Amsterdam UMC streeft naar medische excellentie, door de patiëntenzorg te integreren met wetenschappelijke onderzoek én de opleiding van zorgprofessionals, en bovendien te waarborgen dat we ook maatschappelijke impact hebben op gezondheid.



Amsterdam UMC | Who are we?

3



⌚ January 10, 2023

Olympic rings for Amsterdam UMC

The Amsterdam Collaboration on Health and Safety in Sports (ACHSS) was recently reappointed as the IOC Research Center for the Prevention of Injury and Illness. The ACHSS focuses on developing treatments for the general public. "Innovations for Formula 1 cars always find their way to the cars on the street, the same is true for treatments for elite athletes: after a while they are available to everyone," said Gino Kerkhoffs, professor and head of the Department of Orthopaedic Surgery and Sports Medicine at Amsterdam UMC and one of the chairs of the ACHSS.

4

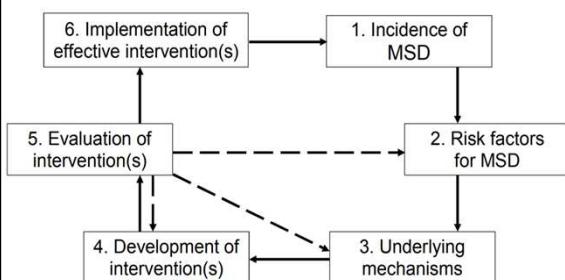


Van Ferrari naar Fiat



5

Van Ferrari naar Fiat - 1. Preventie

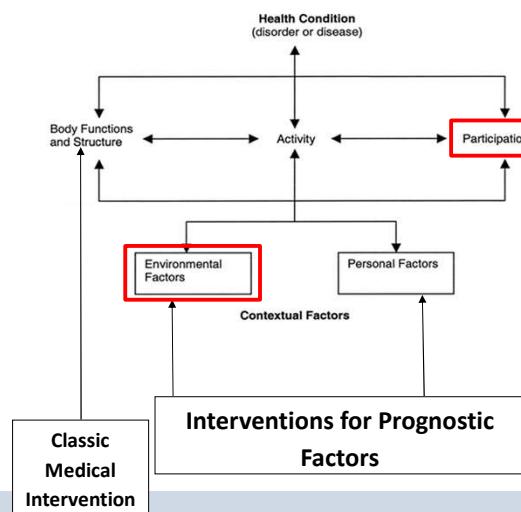


A **research framework** for the development and implementation of **interventions preventing work-related MSDs**
Van der Beek+13 authors & Pieter Coenen, 2017 https://www.sjweh.fi/show_abstract.php?abstract_id=3671

6



Van Ferrari naar Fiat - 2. Werkparticipatie



<https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health>

7



‘Jullie weten wel waarvoor!’



8

The health and economic burden of musculoskeletal disorders in Belgium from 2013 to 2018



Vanessa Gorasso^{1,2*}, Johan Van der Heyden¹, Robby De Pauw^{1,3}, Ingrid Pelgrims^{4,5}, Eva M. De Clercq⁴, Karin De Ridder¹, Stefanie Vandevijvere¹, Stijn Vansteelandt^{4,6}, Bert Vaes⁷, Delphine De Smedt² and Brecht Devleesschauwer^{1,8}

Abstract

Introduction Low back pain (LBP), neck pain (NKP), osteoarthritis (OST) and rheumatoid arthritis (RHE) are among the musculoskeletal (MSK) disorders causing the greatest disability in terms of Years Lived with Disability. The current study aims to analyze the health and economic impact of these MSK disorders in Belgium, providing a summary of morbidity and mortality outcomes from 2013 to 2018, as well as direct and indirect costs from 2013 to 2017.

Methods The health burden of LBP, NKP, OST and RHE in Belgium from 2013 to 2018 was summarized in terms of prevalence and disability-adjusted life years (DALY) using data from the Belgian health interview surveys (BHIS), the INTEGO database (Belgian registration network for general practitioners) and the Global Burden of Diseases study 2019. The economic burden included estimates of direct medical costs and indirect costs, measured by cost of work absenteeism. For this purpose, data of the respondents to the BHIS-2013 were linked with the national health insurance data (intermutualistic agency [IMA] database) 2013–2017.

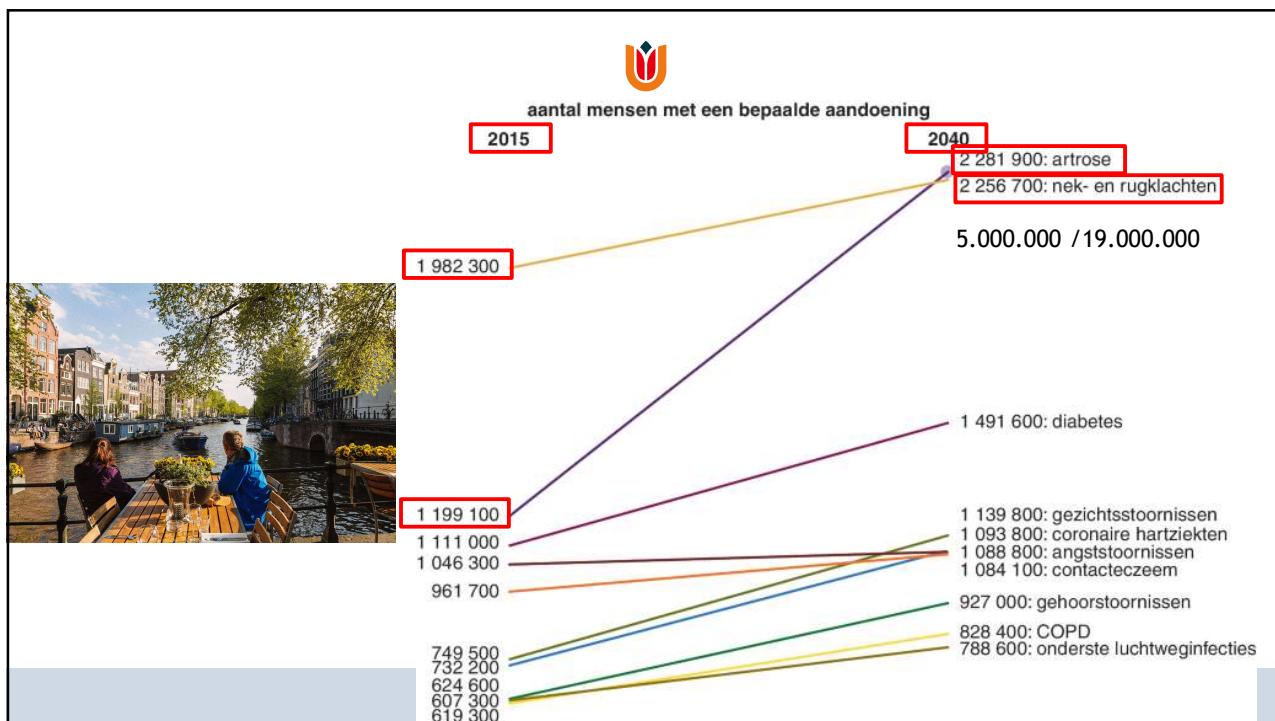
Results In 2018, 2.5 million Belgians were affected by at least one MSK disorder. OST represented the disorder with the highest number of cases for both men and women, followed by LBP. In the same year, MSK disorders contributed to a total of 180,746 DALYs for female and 116,063 DALYs for men. LBP appeared to be the largest contributor to the health burden of MSK. Having at least one MSK disorder costed on average 3 billion € in medical expenses and 2 billion € in indirect costs per year, with LBP being the most costly.

Conclusion MSK disorders represent a major health and economic burden in Belgium. As their burden will probably continue to increase in the future, acting on the risk factors associated to these disorders is crucial to mitigate both the health and economic burden.

Keywords Musculoskeletal disorders, Disability-adjusted life years, Healthcare costs, Absenteeism costs

Gorasso et al. Population Health Metrics (2023) 21:4

9



10

Lage rugpijn

'Globally, Occupational ergonomic factors-attributable LBP led to \$216.1 billion of economic losses worldwide. Of these, \$47.0 billion were paid in healthcare costs, with the public sector serving as the largest contributor (59.2%).'

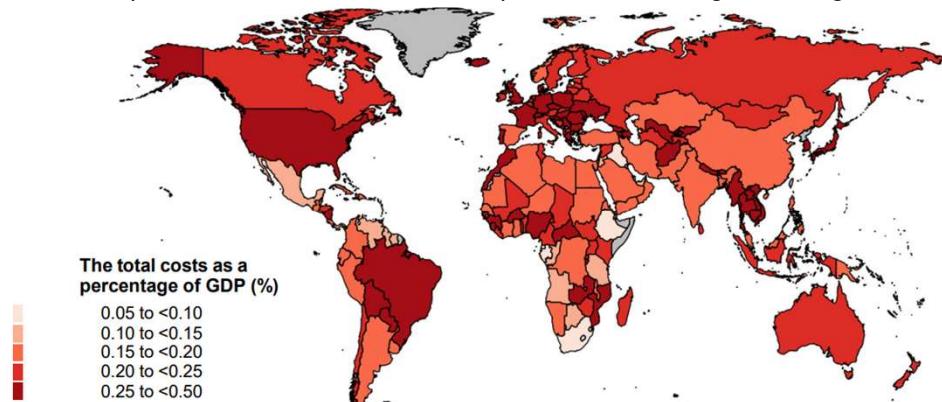


Figure 1. Total costs as a proportion of gross domestic product (GDP), 2019. Note: Grey areas represent countries or territories with no available data.

2023 Chen The global health and economic impact of low-back pain attributable to occupational ergonomic factors in the working-age population by age, sex, geography in 2019, Scand J Work Environ Health - online first: 27 August 2023. doi:10.5271/sjweh.4116, based on 192 countries & territories

11

... knieartrose

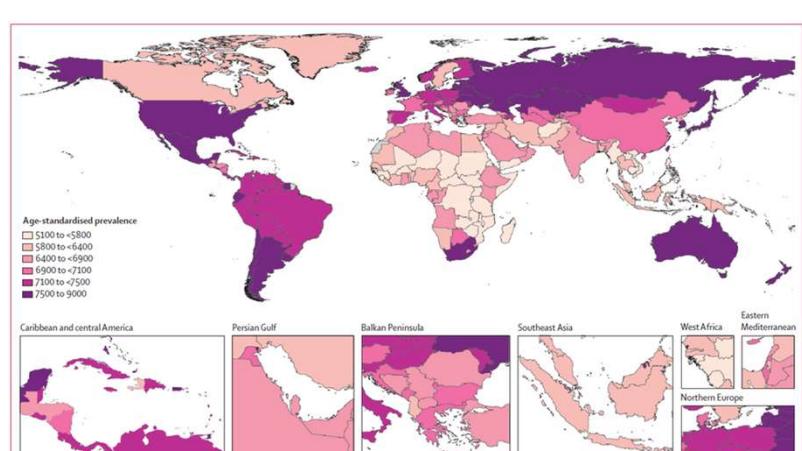
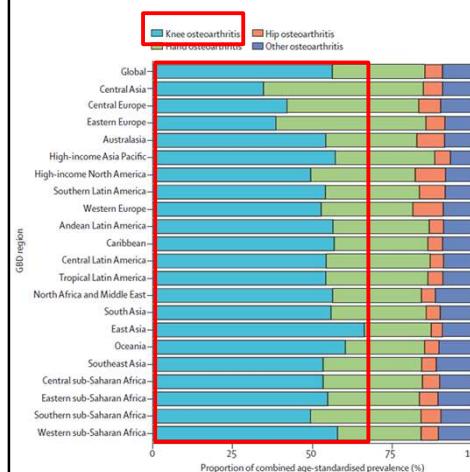


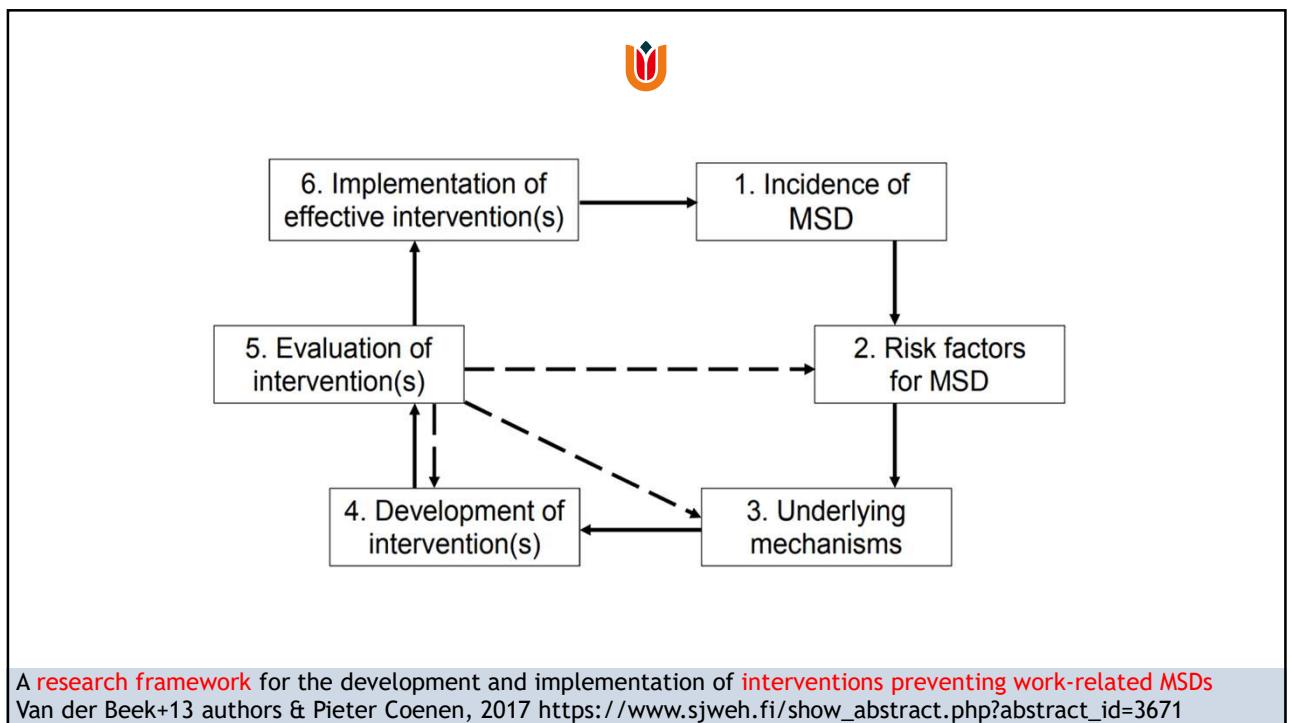
Figure 2: Age-standardised prevalence per 100 000 of total osteoarthritis by country for male and female sexes combined in 2020

2023 GBD 2021 Osteoarthritis Collaborators [https://www.thelancet.com/journals/lanrhe/article/PIIS2665-9913\(23\)00163-7/fulltext](https://www.thelancet.com/journals/lanrhe/article/PIIS2665-9913(23)00163-7/fulltext)

12

1 Preventie

13



14



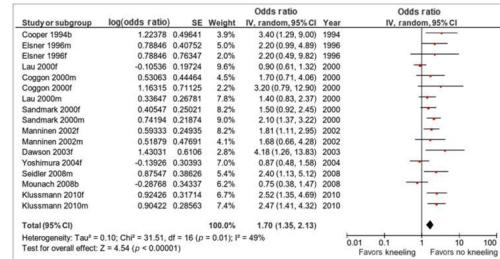
'Disease first approach'

2. Risk factors for MSD

3. Underlying mechanisms



Test for subgroup differences: Not applicable



Lumbosacraal radiculair syndroom

- Tillen > 5 kg/dag > 2 uur of > 25 keer, >10jr
- Buigen romp > 20° > 1 uur per dag

Kuijper e.a. 2018, Neurology

Knieartrose

- Knien/Hurken > 4 uur per dag, >12,5 jr
- Tillen, Klimmen/klauteren

Verbeek e.a. 2017, Safety and Health @ Work

<https://www.beroepsziekten.nl/registratierichtlijnen/aandoeningen-bewegingsapparaat>

15

En daarna...

Kwantitatief

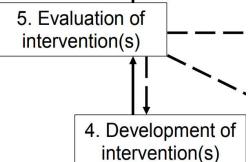
Risico	Analyseren	Meten
Tillen	KIM tillen MAC tillen Lift	NIOSH multi NIOSH 3D SSPP MDD Tillen met één hand
Houding	KIM extreme houdingen WHI RULA REBA OWAS	3D motion capturing Biomechanisch model EMG
Geknield werken	Arbo WHI	

<https://www.ergonomiesite.be/tools/>

16



Health Impact Assessment



Welke gezondheidswinst kunnen we verwachten voor lage rugpijn, lumbosacraal radiculair syndroom en knieartrose als vloerenleggers gaan werken met een vlindermachine in plaats van op de traditionele werkwijze?



Vlindermachine



Traditionele werkwijze



Health Impact Assessment - spaar tijd en geld



- Eenvoudige methode om de brug te slaan tussen ergonomische preventiestudies en epidemiologische studies naar werkgerelateerde gezondheidswinst
- Inzicht in de relatie tussen verminderde blootstelling en afname in werkgerelateerde ziekten
- Nodig - klinisch relevante blootstellingscriteria



Worksite measurements of exposure

- 28 male floor layers during regular working days
 - 18 traditional working techniques
 - 10 manually movable screed-levelling machine
- Age 41 (11) years, height 181 (8) cm, weight 86 (12) kg and seniority 16 (12) years

Open Access | Review

Wearable Motion Capture Devices for the Prevention of Work-Related Musculoskeletal Disorders in Ergonomics—An Overview of Current Applications, Challenges, and Future Opportunities

by Carl Mikael Lind 1,* Farhad Abtahi 2,3,4 and Mikael Forsman 1,2,5

Sensors 2023, 23(9), 4259; <https://doi.org/10.3390/s23094259>



2013 Visser et al. Evaluation of two working methods for screed floor layers on musculoskeletal complaints, work demands and workload.
2016 Visser et al. Stand up: Comparison of two electrical screed levelling machines to reduce the work demands for the knees and low back among floor layers

19



Population Attributable Fraction:

‘The proportional reduction in a disease that would occur if exposure to a risk factor was reduced to an alternative ideal exposure scenario’

$$\text{PAF} = p \times (\text{OR} - 1) / [1 + p \times (\text{OR} - 1)]$$

- p = prevalence of workers exceeding exposure limits
- Odds Ratio
 - LBP = 1.7 (95%CI 1.4-2.0)¹
 - LRS = 2.4 (95%CI 1.7-3.6)²
 - Knee OA = 1.7 (95%CI 1.4-2.1)³

1. 2003 Lötters et al. Model for the work-relatedness of low-back pain

2. 2018 Kuijjer et al. Work-relatedness of lumbosacral radiculopathy syndrome: Review and dose-response meta-analysis

3. 2017 Verbeek et al. Occupational Exposure Risk of Osteoarthritis of the Knee: A Systematic Review and a Dose-Response Meta-Analysis

20



Potential Impact Fraction

'Proportional reduction in incidence due to a reduction in the exposure to physical work demands'

$$PIF = (p - P') \times (IDR - 1) / (p \times (IDR - 1) + 1)$$

- p = prevalence of workers at risk working without an ergonomic intervention ¹
- P' = prevalence of workers at risk working with an ergonomic intervention ²
- IDR = Incidence Density Ratio—which in the present study was replaced with the OR

1. 2013 Visser et al. Evaluation of two working methods for screed floor layers on musculoskeletal complaints, work demands and workload.

2. 2016 Visser et al. Stand up: Comparison of two electrical screed levelling machines to reduce the work demands for the knees and low back among floor layers

21

So the PAF & PIF for knee osteoarthritis are:

$$PAF = p \times (OR - 1) / [1 + p \times (OR - 1)],$$

$p = 14/18$ floor layers exceeded 60 min or more kneel/squat per workday = 0.78
 $OR = 1.7$,

$$\text{makes } 0.78 \times (1.7 - 1) / [1 + 0.78 \times (1.7 - 1)] = 0.78 \times 0.7 / [1 + 0.78 \times 0.7] = 0.546 / 1.546 = 0.35$$

$$PIF = (p - P') \times (OR - 1) / (p \times (OR - 1) + 1)$$

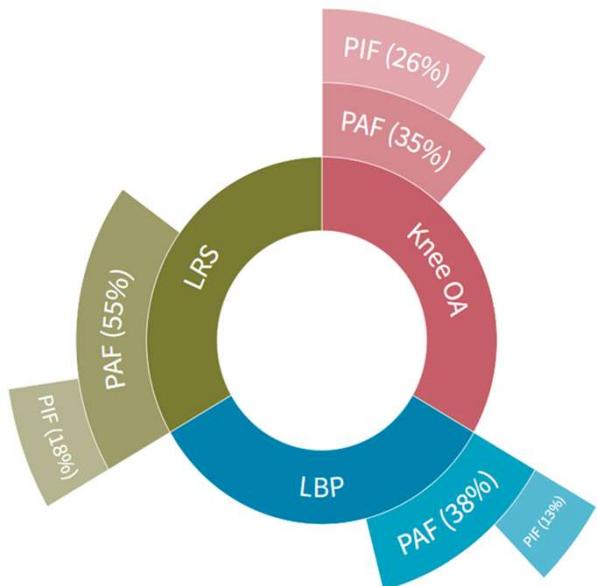
$p = 14/18$ floor layers exceeded 60 min or more kneel/squat per workday = 0.78
 $P' = 2/10$ floor layers exceeded 60 min or more kneel/squat per workday = 0.20
 $OR = 1.7$,

$$\text{makes } (0.78 - 0.2) \times (1.7 - 1) / (0.78 \times (1.7 - 1) + 1) = 0.58 \times 0.7 / (0.78 \times 0.7 + 1) = 0.406 / 1.546 = 0.26$$



22

Resultaten



Kuijer PP FM, van der Molen HF, Visser S. A Health-Impact Assessment of an Ergonomic Measure to Reduce the Risk of Work-Related Lower Back Pain, Lumbosacral Radicular Syndrome and Knee Osteoarthritis among Floor Layers in The Netherlands. International Journal of Environmental Research and Public Health. 2023; 20(5):4672.
<https://doi.org/10.3390/ijerph20054672>

23

Concluderend,

... werken met een handmatig verplaatsbare vlindermachine resulteert naar verwachting in een aanzienlijke daling van vloerenleggers met lage rugpijn, lumbosacraal radiculair syndroom en knieartrose,
en ...

een zogenaamde Health Impact Assessment is een haalbare methode voor het beoordelen van gezondheidswinsten op een efficiënte manier.



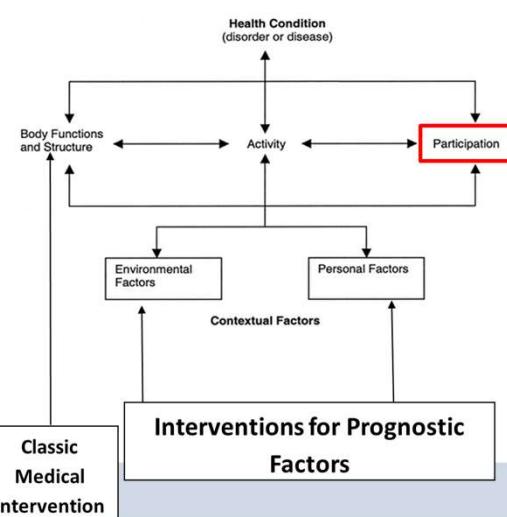
Kuijer PP FM, van der Molen HF, Visser S. A Health-Impact Assessment of an Ergonomic Measure to Reduce the Risk of Work-Related Lower Back Pain, Lumbosacral Radicular Syndrome and Knee Osteoarthritis among Floor Layers in The Netherlands. International Journal of Environmental Research and Public Health. 2023; 20(5):4672.
<https://doi.org/10.3390/ijerph20054672>

24



25

‘Care as usual does not do the trick’



26



3-4 months sicklisted chronic low back pain patients & return to work - what works best: 1, 2 or 3?

Table 1 Definitions of workplace interventions

Workplace adaptation

- 1 The realisation of adaptations in workplace including any technical aids, such as a different chair or desk/table, special tools, a lifting aid, an adapted transport during work, etc

Adaptation in working hours

- 2 Changes in number and/or pattern of working hours: different shifts, less or more hours ("partial work resumption"), more variation in hours, etc

Adaptation of job tasks

- 3 Change of job tasks, including minor changes such as not having to carry things

Multinational 2 year prospective study - USA, Israel, Denmark, Germany, Sweden, Netherlands, n=1631

27



3-4 months sicklisted chronic low back pain patients & return to work - what works best is:

Table 1 Definitions of workplace interventions

Workplace adaptation

- 1 The realisation of adaptations in workplace including any technical aids, such as a different chair or desk/table, special tools, a lifting aid, an adapted transport during work, etc

Median RTW: 206 days

Adaptation in working hours

- 2 Changes in number and/or pattern of working hours: different shifts, less or more hours ("partial work resumption"), more variation in hours, etc

Median RTW: 270 days

Adaptation of job tasks

- 3 Change of job tasks, including minor changes such as not having to carry things

Median RTW: 299 days

Anema 2004 The effectiveness of ergonomic interventions on return-to-work after low back pain; a prospective two year cohort study in six countries on low back pain patients sicklisted for 3-4 months

28



? < 200 days ...

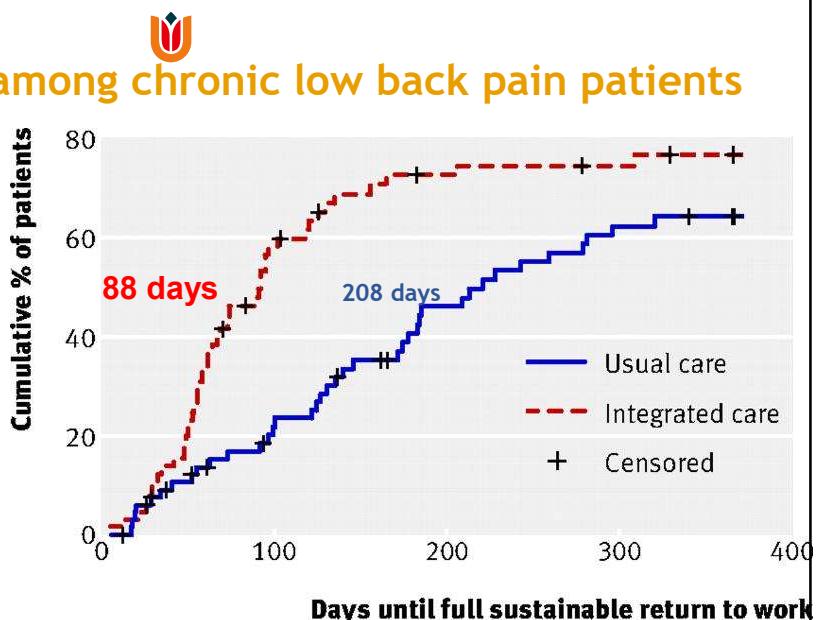
29

Return to work (RTW) among chronic low back pain patients



Overview of integrated care protocol for 12 weeks:

1. Check by orthopedic surgeon
2. Integrated care management by occupational physician
- 3. Workplace intervention!**
4. Time-contingent graded activity



Lambeck 2010 BMJ Randomised controlled trial of integrated care to reduce disability from chronic low back pain in working and private life

30



120 days !

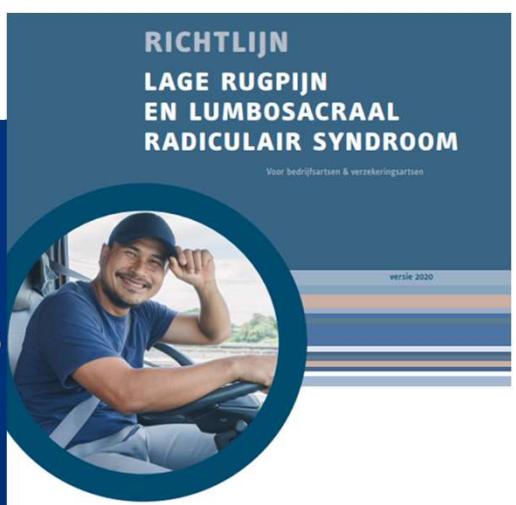
31

Home > Journal of Occupational Rehabilitation > Article

The Dutch Multidisciplinary Occupational Health Guideline to Enhance Work Participation Among Low Back Pain and Lumbosacral Radicular Syndrome Patients

Literature Review | Open Access | Published: 27 July 2021 | 32, 337–352 (2022)

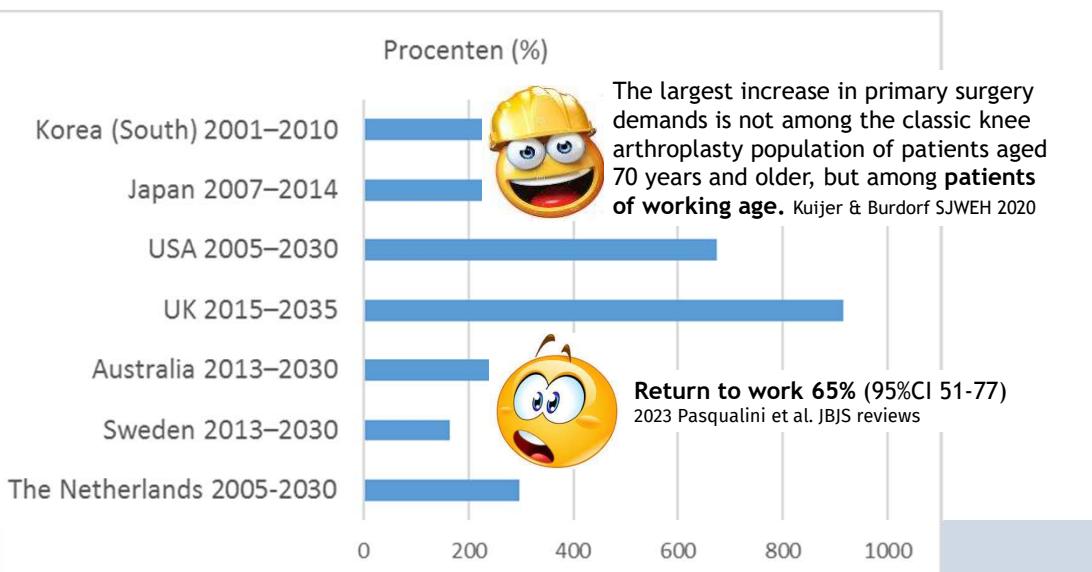
Download PDF  You have full access to this open access article



2022 Luites <https://link.springer.com/article/10.1007/s10926-021-09993-4>

32

Wat is dit?



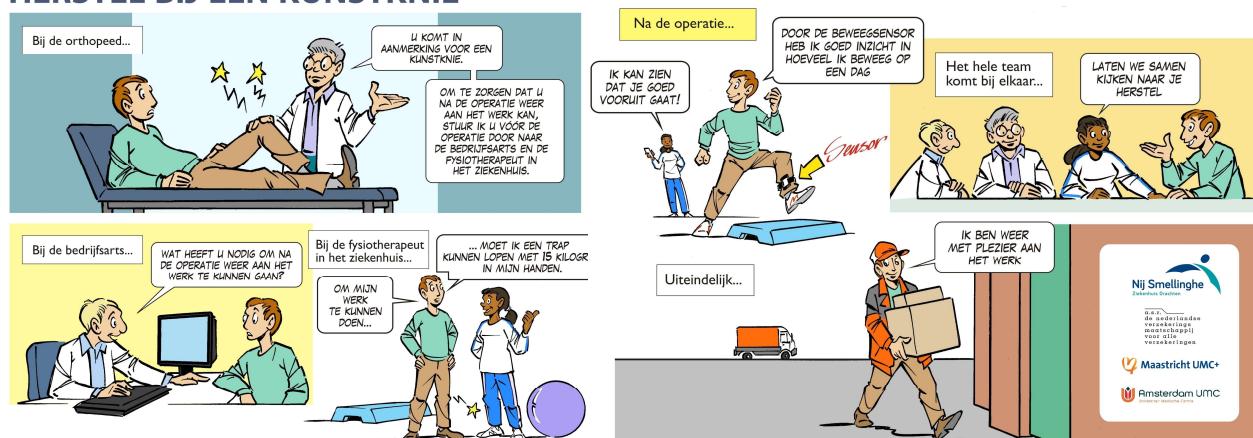
33

Van Ferrari naar Fiat

HERSTEL BIJ EEN KUNSTKNIE



Daniël Strijbos



Strijbos D 2022 Implementation of back at work after surgery (BAAS): A feasibility study of an integrated pathway for improved return to work after knee arthroplasty, <https://doi.org/10.1002/msc.1633>

34



Het verhaal van Dick:

- Vrachtwagenchauffeur veevervoer, 57 jr, 52 uur/4 dagen
- Operatie voor halve knieprothese, rechterknie door artrose
- Lichamelijk zwaar werk- laden en lossen, klimmen en tillen
- Goal Attainment Scaling: 12 weken na operatie 7kg tussen de benen klemmen en gewicht van 7kg van de grond tillen
- Team: Patiënt, Fysio Zknhs, Bedrijfsarts, Werkgever & Arbeidsdeskundige (ivm actoren Wet Verbetering Poortwachter)

Strijbos et al. 2022: <https://www.tbv-online.nl/magazine-artikelen/nieuw-zorgpad-naar-werk/>

35



Betere werkgerichte zorg

- Goal Attainment Scaling: ‘na 8 weken een gewicht van 10 kg tussen zijn benen klemmen op ongelijke ondergrond en tegelijkertijd een tweede gewicht van 10 kg oppakken’
- **Minder klimmen en klauteren door op afstand sluitbare kleppen**
- Eerste dag aan het werk - 6 weken na operatie *
- Volledig aan het werk - 12 weken na operatie *
- ‘Ik vond het een mooie aanvulling. In mijn eentje kan ik dit niet. Goede begeleiding. Iedereen had hetzelfde doel. Soms wou ik te snel en dan was het mooi dat er snel contact was tussen iedereen. Ik heb niet echt verbeterpunten’

Strijbos 2023 Protocol for a multicenter study on effectiveness and economics of the Back At work After Surgery (BAAS): a clinical pathway for knee arthroplasty, BMC MSD

36



Boodschap bij lichamelijk zwaar werk

Van Ferrari naar Fiat



Preventie:

- ‘Disease first approach’
- ‘Health Impact Assessment (PAF & PIF)’

Arbeidsparticipatie:

- ‘Care as usual does not do the trick’-work matters!

<https://www.linkedin.com/in/ppfmkuijer/>