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# OCCUPATIONAL MUSCULOSKELETAL SYMPTOMS, CONSEQUENCES, AND RISK FACTORS IN NEW ZEALAND

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# Outline presentation

- Background
- NZ National survey
- What next?

# Musculoskeletal 'Disorders' vs Symptoms'

The apparent magnitude of the 'musculoskeletal problem' varies depending on the definition used to identify cases

- Musculoskeletal 'Disorders' (MSD)
  - Common inflammatory and degenerative disease and disorders (Buckle & Devereux, 2002)
  - Condition involves the nerves, tendons, muscles and supporting structures of a body with a known lesion (Hurrell, 2001; Burton et. al, 2008)
  - Condition that includes both symptoms and sign (from physical examination) as well as a diagnostic procedure (Violante et al., 2000)
- Musculoskeletal 'Symptoms' (MSS)
  - A sign of the *subjective feeling and self-reported nature* of symptoms (Burton et al., 2008)
  - Including aches, discomfort, complaint and pain (Kuorinka, 1987)

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# MSS Prevalence – examples
# Previous studies in the world

MSS prevalence amongst general and working populations in the world is high, e.g.:

- Aluminium workers in Norway (93%) (Morken et al. 2000)
- General population in Norway (91%) (Kamaleri et al. 2008)
- Japanese nurses (85%) (Smith et al. 2006)
- Commercial fishers in North Carolina (83%) (Lipscomb 2004)
- Cleaners in UK (74%) (Woods 2006)

# MSS Prevalence – Previous studies in NZ

| Population | 12-month Prevalence | | Author(s) |
|---|---|---|---|
| | Any body regions | Low back | |
| School children# (*n*=245) | 58% (spinal region) | 35% | Trevelyan, F. & Legg, S. (2010) |
| Veterinarians (*n*=867) | 96% | 73% | Scuffham, A. M., Legg, S. J., Firth, E. C., & Stevenson, M. A. (2010) |
| Teachers (*n*=76) | 93% | 62% | Dykes, R. (2009) |
| Postal workers (*n*=116) | 88% | 52% | Harcombe, H., McBride, D., Derrett, S., & Gray, A. (2009) |
| Nurses (*n*=181) | 93% | 62% | Harcombe, H., McBride, D., Derrett, S., & Gray, A. (2009) |
| Office workers (*n*=146) | 84% | 45% | Harcombe, H., McBride, D., Derrett, S., & Gray, A. (2009) |
| Dentist (*n*=413) | N/A | 63% | Palliser, C. R., Firth, H. M., Feyer, A. M., & Paulin, S. M. (2005) |

# NZ National Survey of The Burden of Occupational Ill Health

- Funded by HRC/ACC/DoL
- Principal Investigator: Prof. Neil Pearce
- Large national survey of self-reported occupational exposure, workplace practices and occupational ill-health, including musculoskeletal symptoms (MSS)
- Conducted between 2004 to 2006

- 10,000 men and women aged 20-64 were randomly selected from the NZ Electoral Roll

- Telephone interview
  - Occupational history
  - Current workplace exposures
  - Respiratory symptoms
  - Sleep patterns
  - **Musculoskeletal symptoms (MSS)**

# Objectives of MSS survey

- To report the prevalence of MSS in a NZ working population
- To identify which body region(s) has the highest prevalence, to determine the priority for interventions
- To report the prevalence of MSS consequences (focussing on low back symptoms (LBS))
- To assess risk factors for LBS and its consequences

# MSS Questionnaire
## (based on Nordic Musculoskeletal Questionnaire)

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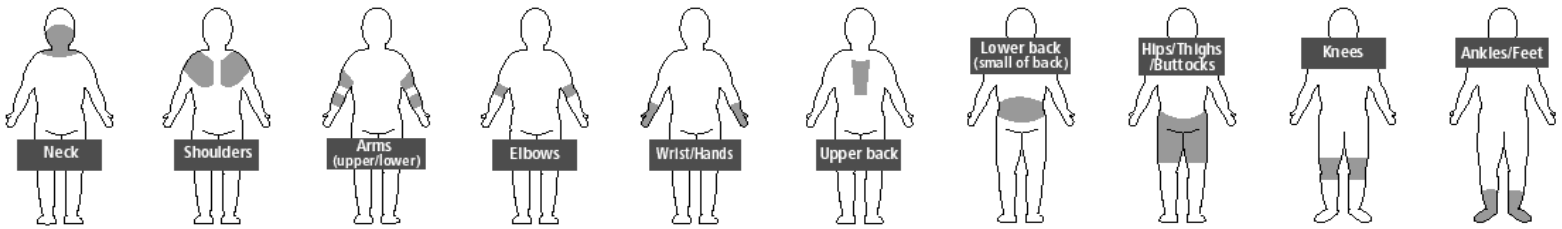
## MUSCLE AND JOINT ACHES AND PAINS

**PLEASE ANSWER ALL THE QUESTIONS,** EVEN IF YOU HAVE NEVER HAD ANY TROUBLE IN ANY PARTS OF THE BODY.

| | **Q1** Have you at any time during the last 12 months **had any trouble** (such as aches, pains, discomfort, numbness) in your: | **Q2** During the last 12 months, have you been **prevented from carrying out normal activities** (e.g. housework, hobbies, gardening) because of this trouble? | **Q3** During the last 12 months have you been **absent from work** because of this trouble in your: | **Q4** How often **do you get,** or **have you had** this trouble during the last 12 months? |
|---|---|---|---|---|
| **Neck** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Shoulders** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Arms** (upper and lower) | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Elbows** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Wrists/Hands** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Upper back** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Lower back** (small of back) | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Hips/Thighs/Buttocks** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Knees** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |
| **Ankles/Feet** | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | No ☐₁ Yes ☐₂ | Daily ☐₁, one or more times: a week ☐₂ a month ☐₃ a year ☐₄ one episode of trouble only ☐₅ Never ☐₆ |



# MSS Risk Factors Questions (based on HSE UK)

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## Physical Factors

- Awkward or tiring position
- Awkward grip or hand movements
- Lifting
- Carrying out repetitive task
- Working at high speed
- Standing
- Sitting
- Using tools that vibrate

## Psychosocial Factors

- Working to tight deadlines
- Boring work
- Contact and cooperation with management
- Level and difficulty of work
- Work stress

## Organisational Factors

- Work organisation
- Organisational culture

## Environmental Factors

- Working in a cold/damp environment
- Working in a hot/warm environment
- Working outside
- Exposure to loud noise

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# Data Analysis

- Prevalence:

  % of people with MSS during last 12 months with 95% Confidence Interval (95% CI)

- Risk factors:

  Logistic regression analyses, adjusted for all explanatory variables

  Reported in term of odds ratios (ORs) and their 95% CI

# Comparison of MSS prevalence – Males vs Females

| Body region | Males | | Females | | All | |
|---|---|---|---|---|---|---|
| Neck ** | 39 | (37-42) | 46 | (44-49) | 43 | (41-45) |
| Shoulders ** | 38 | (36-41) | 46 | (44-48) | 42 | (40-44) |
| Arm | 16 | (14-18) | 19 | (17-21) | 18 | (16- 19) |
| Elbows ** | 16 | (14-18) | 12 | (10-13) | 14 | (12-15) |
| Wrist-hands ** | 27 | (25-30) | 32 | (30-34) | 30 | (28-31) |
| Upper back ** | 15 | (13-17) | 23 | (21-25) | 19 | (18-21) |
| Low back ** | 56 | (54-59) | 51 | (49-54) | 54 | (52-56) |
| Hips-thighs-buttocks ** | 16 | (14-18) | 23 | (21-25) | 19 | (18-21) |
| Knees ** | 34 | (32-36) | 27 | (25-30) | 31 | (29-32) |
| Ankles-feet | 19 | (17-21) | 21 | (19-23) | 20 | (19-22) |
| Any MSS | 91 | (90-93) | 92 | (91-93) | 92 | (91-93) |

*$p<0.05$ **$p<0.01$ indicate differences between gender

# Comparison of MSS prevalence – Light vs Heavy Physical Workload

| Body region | Light physical workload [a] | Heavy physical workload [b] |
|---|---|---|
| Neck * | 44 (43-47) | 39 (35-43) |
| Shoulders | 42 (40-44) | 43 (40-47) |
| Arms ** | 16 (15-18) | 22 (19-25) |
| Elbows ** | 12 (10-13) | 20 (17-23) |
| Wrist-hands ** | 28 (26-30) | 35 (31-38) |
| Upper back | 19 (18-21) | 19 (16-22) |
| Low back * | 52 (50-54) | 57 (54-61) |
| Hips-thighs-buttocks | 20 (18-21) | 19 (16-22) |
| Knees ** | 29 (27-31) | 35 (31-38) |
| Ankles-feet | 20 (18-22) | 21 (18-24) |

*$p<0.05$ **$p<0.01$ indicates differences between light and heavy physical workload

[a]Light : Legislator & Administrator, Professional, Technical & Associate Professional, Clerks, Service & Sales workers
[b]Heavy: Agriculture & Fishery workers, Trade workers, Plant & Machine operators & assemblers, Elementary workers

# Prevalence and Risk Factors for LBS and its consequences

| | LBS | LBS Consequences | |
|---|---|---|---|
| | | Reduced Activities | Absenteeism |
| Prevalence | 54 (52-56) | 18 (17-20) | 9 (8-10) |
| Physical factors | Awkward or tiring position<br>OR 1.37<br>(95% CI 1.12-1.68) | Lifting<br>OR 1.79<br>(95% CI 1.16-2.77) | Awkward or tiring position<br>OR 2.11<br>(95% CI 1.20-3.70) |
| Psychosocial factors | Work stress<br>OR 1.46<br>(95% CI 1.05-2.03) | --- | --- |
| Organisational factors | --- | --- | --- |
| Environmental factors | --- | --- | Working in a cold/damp environment<br>OR 2.18<br>(95% CI 1.11-4.28) |

# Conclusions

- New Zealand working population has a high prevalence of MSS (92%)
- The highest prevalence was for low back (54%), neck (43%), and shoulders (42%)
- The prevalence of reduced activities and absenteeism due to LBS were 18% and 9%, respectively
- To reduce the prevalence of LBS and its consequences, it is necessary to address both physical (reducing awkward or tiring position and lifting) and psychosocial (manage work stress) factors
- Additional focus for intervention is to reduce work in cold/damp environment

# What Next?

- Indonesian coal mining workers study (*n*=1294)
  - 12-month prevalence: 75% (LBS), 16% (reduced activities), 13% (absenteeism)
  - Combined effect of physical and psychosocial factors
    - Those with high physical and high psychosocial exposure had the highest risk of LBS and its consequences
    - A high psychosocial exposure was necessary to increase the risk of LBS and its consequences
    - Smoking and night shift work were associated with LBS and its consequences
- Collaboration with Danish National Research Centre for Work Environment on efficacy of MSS Prevention Packages
- Future studies in NZ should focus on MSS intervention, implementation and efficacy

# Publications from this study

## Journals:


Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S., Douwes, J., Ellison-Loschmann, L., Mclean, D. & Pearce, N., 2011. Prevalence of musculoskeletal symptoms in relation to gender, age, and occupational/industrial group. *International Journal of Industrial Ergonomics, 41 (5), 561-572.*

Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S. & Pearce, N., 2011. Prevalence and work-related risk factors for reduced activities and absenteeism due to low back symptoms. *Appl. Ergon., 43 (4), 727-737.*

Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S. & Pearce, N., 2011. Gender differences in work-related risk factors associated with low back symptoms. *Ergonomics, 55 (3), 327-342*


## Conference:


Widanarko, B., Legg, S.J., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S., Douwes, J., Ellison-Loshmann, L., Mclean, D. & Pearce, N., 2009. Prevalence of low back pain in relation to age, gender, and occupation amongst New Zealand empyolees. *In Adank, R.G. & Gardner Wood, L. eds. New Zealand Ergonomics Society's 15th Conference: Ergonomics for the Ageing Population. Martinborough, New Zealand.*

Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S., Douwes, J., Ellison-Loschmann, L., Mclean, D. & Pearce, N., 2010. Work-related risk factors associated with musculoskeletal symptoms among New Zealand workers. *In Olsen, K.B. & Tappin, D. eds. New Zealand Ergonomics Society's 16th Conference: Preventing Work-Related Musculoskeletal Disorders: Present and Future Challenges. Nelson, New Zealand: New Zealand Ergonomics Society Inc.*

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