



Missing values in estimates of incidence of occupational diseases

- learning from data Dutch construction -

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Workplace

SHORT REPORT

Incidence rates of occupational diseases in the Dutch construction sector, 2010–2014

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ABSTRACT

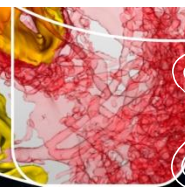
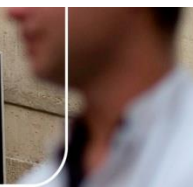
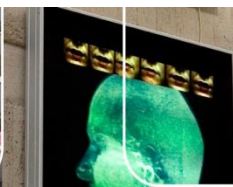
Objective To estimate incidence and trends in incidence of occupational diseases (ODs) in the Dutch construction sector.

Methods In a dynamic prospective cohort over a 5-year period (2010–2014), ODs assessed by occupational physicians (OPs) participating in a voluntary construction workers health surveillance (WHS) were reported to the Netherlands Centre for Occupational Diseases (NCCOD). ODs were defined as a disease with a specific clinical diagnosis (International Classification of Diseases) that was predominantly caused by work-related factors as assessed by an OP. Annual incidences were determined for the total number of ODs and six frequently occurring OD groups. Trends in incidence were estimated using a multilevel negative binomial regression model.

Results In 2014 the incidence of all OD was 12 964 per 100 000 workers and there was no significant

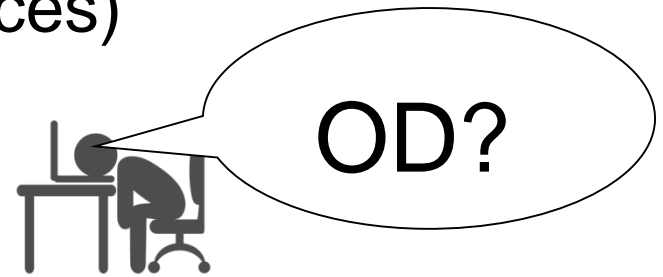
What this paper adds

- ▶ Annual incidences of occupational diseases are reported for the Dutch construction industry, high incidences were reported for noise-induced hearing loss and musculoskeletal diseases.
- ▶ Significantly increasing trends in noise-induced hearing loss and work-related contact dermatitis were observed.
- ▶ Changes in incidence rate ratios over time could be helpful for prioritising and evaluating sector-specific interventions to prevent occupational diseases.



Zero report of occupational disease by OP?

- Physician assess and conclude no OD
 - good work(ing circumstances)



- Physician does not assess
 - no time
 - no relevancy
 - no knowledge.....



Problem

Missing OD report handled:

as true zero (assessment of no OD and therefore not reported)

or

as missing OD reports (no assessment and therefore not reported OD)

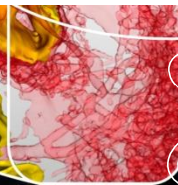
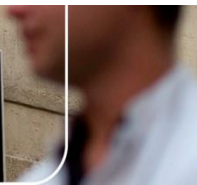


Background

Annual incidences of occupational diseases reported for the Dutch construction industry

Originating from occupational physicians during workers health surveillance in 2010-2014

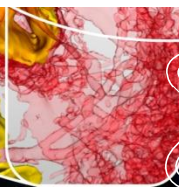
Covering 40-50% of the Dutch construction workers



Background

Variability in number of reporting OPs and reporting ODs

Without knowledge of reason of no OD reporting in a specific year



Objective

To compare different methods of handling missing data in regression analyses estimating trends in incidence of physician-reported occupational diseases using surveillance data



Methods: Exploratory Sensitivity Analysis

3 scenario's (S) including 18,893 ODs from 253 OPs during 2010-2014

- S1 including only OD reports and corresponding OP, so no zero cases in the regression analyses
- S2 imputing zero reports for OP when no OD reported, so true zero report and missing OD analysed both as true zero reports
- S3 imputing zero reports only when OP has demonstrated to be active in WHS in specific year, so assuming true zero reports for that specific year.



Statistics

2 level negative binomial regression model: ODs clustered within OPs

Time (year): treated as a continuous variable

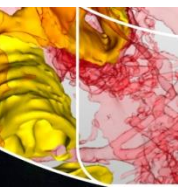
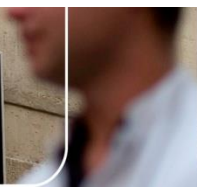
Population estimates, as natural logarithms of the annual number of workers visiting a WHS

Stata V.9



Results: Trendanalysis 2010-2014

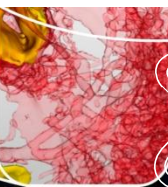
Diagnosis	S1 No 0-reports		S2 No report = 0		S3 No report = 0 if OP ≥ 1 report that year	
	IRR	95%CI	IRR	95%CI	IRR	95%CI
Total	1.08	1.03-1.12	0.94	0.88-0.99	1.03	0.98-1.09
NI Hearing Loss	1.11	1.05-1.16	0.99	0.92-1.05	1.07	1.01-1.13
Low Back Pain	1.05	0.98-1.12	0.85	0.77-0.93	0.94	0.86-1.02
RSI	1.05	0.98-1.12	0.91	0.84-0.98	1.00	0.92-1.07
Arthrosis	1.08	1.00-1.16	0.89	0.80-0.98	0.96	0.87-1.05
Distress, Burnout	1.12	1.05-1.20	0.99	0.91-1.08	1.07	0.98-1.16
Contact dermatitis	1.22	1.10-1.35	1.12	0.99-1.25	1.19	1.06-1,33
COPD , Asthma	1.23	1.00-1.47	0.84	0.60-1.08	0.93	0.68-1.18



Trendanalysis 2010-2014

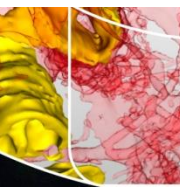
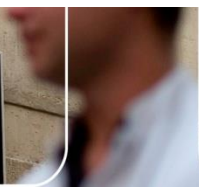
Diagnosis	No 0-reports	No report = 0	No report = 0 if OP ≥ 1 report that year
	moving trends towards increase	moving trends towards decrease	moving trends towards no change
Total	↑↑*	↓*	↑
NI Hearing Loss	↑↑*	↓	↑*
Low Back Pain	↑	↓↓*	↓
RSI	↑	↓*	=
Arthrosis	↑	↓↓*	↓
Distress, Burnout	↑↑*	↓	↑
Contact dermatitis	↑↑*	↑	↑*
COPD , Asthma	↑	↓↓*	↓

* $p \leq 0.05$



Scenario 3, assumed closest match to actual situation

Diagnosis ICD-10	IRR	95%CI
Total	1.03	(0.98-1.09)
Noise Induced Hearing Loss	1.07	(1.01-1.13)
Non-specific Low Back Pain	0.94	(0.86-1.02)
Repetitive Strain Injuries	1.00	(0.92-1.07)
Distress/Burnout	1.07	(0.98-1.16)
Contact Dermatitis	1.19	(1.06-1.33)
COPD/Asthma	0.93	(0.68-1.18)



Conclusion and discussion

Imputing zero reports when OP has demonstrated to be active in a specific year

Assuming true zero reports as closest match to the presumed situation

Presumed situation is an OP not seeing any cases of OD is unlikely to reporting in a specific year



Questions or Suggestions?



Guidelines for signalling and prevention of occupational diseases
two examples: lumbar herniated disc disease and stress related disorders

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1 Objective
The development of evidence informed occupational disease guidelines to identify and counteract lumbar herniated disc disease (LHDD) and stress related disorders (SRD).

2 Methods
To support Dutch occupational physicians in signalling and preventing ODs, transparent and evidence-based clinical decision criteria were developed for LHDD and SRD. Systematic reviews and meta-analyses with grading of the evidence were used.

3 Lumbar Herniated Disc Disease
In total 22 LHDD studies were included in the systematic review. Bending & twisting of the trunk and lifting & bending of the trunk were the highest work-related risk factors for LHDD with relative risks of 2.4 (95%CI: 1.67-3.55) and 2.8 (95%CI: 2.18-3.69), respectively (Table 1).

4 Stress Related Disorders
In total 12 SRD studies were included in the systematic review. Effort-reward imbalance and low procedural justice were the highest work-related risk factors for SRD with relative risks of 2.0 (95%CI: 1.81-2.22) and 1.8 (95%CI: 1.60-1.98), respectively (Table 2).

Table 1. Risk factors meta-analyses lumbar herniated disc

Lumbar herniated disc disease	OR	95%CI
Physical workload	2.03	1.48-2.79
Lifting & carrying	1.41	0.93-2.14
Bending & twisting trunk	2.43	1.67-3.55
Lifting & bending trunk	2.84	2.18-3.69

Table 2. Risk factors meta-analyses stress related disorders

Stress related disorders	OR	95%CI
Effort-reward imbalance	2.00	1.81-2.22
High psychological job demands	1.49	1.36-1.62
Low decision authority	1.34	1.20-1.49
Low co-worker support	1.29	1.17-1.41
Low supervisor support	1.27	1.16-1.38
Low procedural justice	1.78	1.60-1.98
Low relational justice	1.49	1.34-1.65
High emotional demands	1.62	1.36-1.93

Is it work-related, doc?

5 Conclusions
Several disease-specific work-related risk factors for LHDD and SRD have been established confirming the multifactorial aetiology. The clinically assessed threshold limit of the risk factors are the starting point for the selection of preventive interventions to reduce these occupational diseases.

6 Exposure threshold limits in practice
An example of a threshold limit for a risk factor of LHDD is daily bending of the trunk more than 20 degrees for at least one hour a day. An example for SRD is a combination of high time pressure and low decision authority, e.g. after a reorganisation.

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