

Industrial Injuries Advisory Council Information note

Chronic Obstructive Pulmonary Disease in Woodworkers (Joiners and Carpenters)

August 2015

1. In June 2014, an MP wrote to Ministers, on behalf of a constituent, requesting that the case be considered for prescription of chronic obstructive pulmonary disease (COPD) in workers exposed to wood dust. The MP's inquiry followed publication of a new systematic review on COPD and occupation by Omland *et al.* (2014).
2. This information note summarises the position of the Industrial Injuries Advisory Council (IIAC) on the topic.

Chronic Obstructive Pulmonary Disease

3. COPD is defined primarily in terms of a reduction in lung function, measured using a technique known as spirometry. Specifically, in routine clinical practice COPD is said to be present when there is a significant reduction in the ratio of the volume of air that can be expelled in the first second of a forced expiration (the FEV₁) to the total volume that can be exhaled (the Forced Vital Capacity, FVC); this lower ratio is often accompanied by an absolute reduction in FEV₁.
4. The most important cause of COPD is cigarette smoking, but a number of workplace practices have also been implicated; one such (coal mining) is already prescribed under the Industrial Injuries Scheme. Emphysema, a common feature of COPD, is prescribed in relation to work with cadmium fume.
5. Within the Scheme, COPD is defined in terms of a 'disabling' loss of lung function, namely an FEV₁ value more than 1 litre below that predicted for a person's age, sex and height, or less than 1 litre in absolute terms. Prescription has followed where the risks of such disabling loss of FEV₁ were more than doubled by defined circumstances of occupational exposure, as explained in other reports of the Council (Cm 2091, 1992; Cm 8906, 2014).

COPD and wood working

6. The Omland review considered 4,500 citations, of which four (Heederik *et al.*, 1987; Shamssain, 1992; Glindmeyer *et al.*, 2008; Jacobsen *et al.*, 2008) related to wood dust exposure and COPD. The Research Working Group of the Council organised an additional, full literature search which identified a further six reports.
7. A summary of each of the 10 relevant studies is provided in a table concluding this report; none involved a UK workforce and all but two were of cross-sectional design.
8. Longitudinal studies, in which a group of workers is followed across a period of time to track new or worsening disease, are considered to provide a higher level of scientific evidence than cross-sectional studies. One of the only two studies of this design (Glindmeyer *et al.*, 2008) found no association between exposure to wood dust and changes in spirometry. The second (Jacobsen *et al.*, 2008) reported a small effect in women who smoked, but not in men, whether smokers or non-smokers.
9. The findings of the cross-sectional studies were inconsistent, in that two (Shamssain, 1992, Thetkathuek *et al.*, 2010) suggested a relationship between a reduced FEV₁/FVC ratio and exposure to wood dust whereas five did not (Mandryk *et al.*, 2000; Schlunssen *et al.*, 2002; Douwes *et al.*, 2006; Meo, 2006; Osman *et al.*, 2009). Reports of reductions in FEV₁ were similarly inconsistent; five studies indicated a reduction in exposed workers (Heederik *et al.*, 1987; Shamssain, 1992; Mandryk *et al.*, 2000; Douwes *et al.*, 2006; Meo, 2006) but three (Schlunssen *et al.* 2002; Osman *et al.* 2009; Thetkathuek *et al.*, 2010) did not. Where positive associations were found, the average losses varied between about 200ml and about 900ml. No data were available on how common a disabling loss of FEV₁ (by the Scheme's definition) was in those exposed to wood dust versus those without. There were very few comparable measurements of exposure levels.

Conclusions

10. The available evidence for a relationship between COPD and work with wood dusts is limited, of variable quality and inconsistent in its findings. No studies

have been identified which suggest circumstances in which the risks of disabling loss of FEV₁ are as much as doubled, the threshold applied in previous recommendations for prescription (Cm 2091, 1992). Accordingly, the Council has concluded that there is insufficient evidence to warrant recommending woodworkers be added to the list of prescribed occupations for COPD (Prescribed Disease D12).

11. It should be noted that certain wood dusts, mainly hardwood dusts, are capable of causing occupational asthma, which, in its chronic form, may have features similar to those of COPD. Occupational asthma caused by wood dusts is compensable under the Scheme, as Prescribed Disease D7.

References

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Table. Summary of evidence about COPD and woodworkers

| Reference | Country | Design | Setting | Numbers | Main finding | Other findings |
|---------------------------------|---------|--|---|---|---|--|
| Longitudinal studies | | | | | | |
| Glindmeyer <i>et al.</i> , 2008 | USA | Longitudinal (prospective) over about 4 years: minimum 2.5 years | Employees of 10 wood-processing facilities; on average they had been working for about 15 years in the industry | 1164 | No relationship between estimated exposure to 'wood solids' and any changes in spirometry. | In milling and plywood facilities, exposure to 'residual dust' (non-wood) associated with more rapid decline in FEV ₁ (about -22ml per year) and FEV ₁ /FVC (-0.3% per annum). In plywood facilities also reduction in FVC (about -40ml per year) |
| Jacobson <i>et al.</i> , 2008 | Denmark | Longitudinal (prospective) over 6 years | 54 'dry wood' (mixed varieties) factories in Viborg county; 3 comparator factories | 1112 (61%) exposed; 235 (57%) unexposed | Exposed women who smoked had a more rapid annual decline in FEV ₁ (-37ml) and FVC (-32ml) than their unexposed counterparts (-24ml and -22ml). No effect was found in non-smoking women or in men, irrespective of smoking habits. | Statistically significant relationship to estimated cumulative exposure after adjustment for smoking habit, but only in women. Non-significant trend for FEV ₁ /FVC<70% (≈COPD) across 3 cumulative exposure categories after adjustment for smoking in women |

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| | | | | | | but not men |
| Cross-sectional studies | | | | | | |
| Heederik <i>et al.</i> , 1987 | Netherlands | Cross-sectional survey | Paper mill (manufacturing toilet paper): 'paper dust' rather than 'wood dust' | 46 exposed; 40 unexposed (offices of same factory) | FEV ₁ some 200ml (p<0.05) lower on average in exposed workers after adjustment for age, sex and smoking. | |
| Shamssain <i>et al.</i> , 1992 | South Africa | Cross-sectional survey | Non-smoker employees of a furniture factory (pine and MDF) vs. a referent factory | 145 exposed; 152 unexposed | 30% of all exposed workers had FEV ₁ /FVC<70% (vs 17% unexposed). Reduced FEV ₁ (on average about 500ml) in men, but not women, from furniture factory. | FEV ₁ /FVC <70% by years employment: 1-9: 27% 10+: 56% |
| Mandryk <i>et al.</i> , 2000 | Australia | Cross-sectional survey | Sawmill (Eucalyptus) | 87 mill workers; 30 controls | Reduced FEV ₁ (by about 10% of predicted value) in mill workers. No reduction in FEV ₁ /FVC ratio. | Little evidence of any relationship between lung function and personal dust exposures. |
| Schlunssen <i>et al.</i> , 2002 | Denmark | Cross-sectional survey | Furniture factories (average dust exposures were low); Other factories (control) | 1766 woodworkers; 319 controls | No differences in lung function between woodworkers and controls. | Cross-shift reductions in FEV ₁ were found among pine workers. |
| Douwes <i>et al.</i> , 2006 | New Zealand | Cross-sectional survey | Sawmill | 50 with asthma; 156 without | 190ml (230ml) reduction in FEV ₁ (FVC) on average in | No association between exposure and any cross-shift |

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| | | | | asthma | those with high 'dry dust' exposure; 260ml (350ml) mean reduction in FEV ₁ (FVC) in those with high 'green dust' exposure. No reduction in FEV ₁ /FVC ratio. | changes in lung function. Both obstructive and restrictive changes in lung function were associated with dust exposure. |
| Meo, 2006 | Pakistan | Cross-sectional survey | Furniture workshops; Other workers (control) | 46 non-smoking, exposed; 46 matched, non-exposed | Both FEV ₁ and FVC (but not their ratio) lower in the 25 woodworkers with more than 4 years of exposure; in those with more than 8 years exposure the average loss in FEV ₁ was 900ml. | |
| Osman <i>et al.</i> , 2009 | Turkey | Cross-sectional survey | Furniture factories; Other factories (control) | 328 exposed workers; 328 unexposed | Spirometry results were better in those with higher dust exposures. | |
| Thetkathuek <i>et al.</i> , 2010 | Thailand | Cross-sectional survey | Furniture factory (rubberwood) | 685 employees | FVC and FEV/FVC (but not FEV ₁) were inversely related to mean dust exposure levels. | |