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5. **Boocock MG,** McNair PJ, Larmer PJ, *et al*. Interventions for the prevention and management of neck/upper extremity musculoskeletal conditions: a systematic review. *Occup Environ Med* 2007;**64**:291–303.
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The findings of our systematic review (***see page 277***) showed that ergonomic interventions are not effective for preventing or reducing low back pain (LBP) and neck pain among non-sick listed workers. In this systematic review only randomised controlled trials (RCTs) were included, but Westgaard (***see page 217***) questions whether study designs other than RCTs (eg, quasi-experimental and qualitative studies) would be also suitable for evaluating the effectiveness of ergonomic interventions in the workplace. For a long time, the conduct of a systematic review on RCTs only was not possible because RCTs on ergonomic interventions were lacking. Therefore, reviews also included study designs that were suspicious for bias (ie, pre–post trials, prospective cohort studies, controlled trials and quasi-experimental trials).[1 2] However, in recent years, more and more information from RCTs on ergonomic interventions has become available and this allowed us to conduct our systematic review. Although we agree that other study designs can add to the existing knowledge on ergonomic interventions, we believe that the RCT is the gold standard for investigating the effectiveness of different interventions untainted by bias.[3]

In his commentary, Westgaard points out that although the purpose of the RCT is to control for most unforeseen factors, interventions conducted in complex environments may be affected by organisational changes, financial problems, lack of management support or other issues and, as a result, study results may be influenced. In our opinion these factors could hamper evaluation of the potential effects of ergonomic interventions in all types of studies except for those carried out in laboratory settings. These unforeseen factors are in fact an inevitable part of applying ergonomic interventions in real (working) life. A possible solution to reduce the influences of these factors is to perform cluster randomisation at the level of the workplace (department or working unit). Similarly to individual randomised trials, the cluster randomised trial also minimises the risk of bias. Moreover, by performing a cluster randomisation, contamination between workers in the intervention group and those in the control group is avoided.[4]

We strongly support the opinion of Westgaard that researchers should conduct a process evaluation alongside their RCT. Not only can process evaluation help researchers to understand unexpected study results,[5] but it can also shed light on whether the intervention was delivered as intended and resulted in the implementation and use of ergonomic measures (ie, implementation, compliance, satisfactions and experiences) and on the successes and failures of the intervention.[6] We found that implementation of ergonomic measures was poorly reported in ergonomic intervention studies, while the effectiveness of ergonomic interventions is strongly determined by its end-users. To improve compliance, future ergonomic interventions should use an adequate implementation strategy.[7] Furthermore, researchers should improve reporting on compliance.

Westgaard questions whether the performance of our meta-analysis was appropriate. In our opinion, a meta-analysis was possible because the studies used similar questionnaires to measure incidence/prevalence. Furthermore, only physical ergonomic interventions (interventions aimed at redesigning the workplace) with more or less similar interventions were pooled, for example, the provision of a new mouse, new kitchen equipment or arm supports, and adjustments to desk heights. Moreover, the I^2 (a measure that quantifies inconsistency across studies) supported the performance of pooling in a meta-analysis.[8]

We agree with Westgaard's final point that the conclusions of our review have to be interpreted with caution. First of all, we found limited studies per outcome measure and secondly, most studies were conducted in an office setting and study populations consisted of both symptomatic and non-symptomatic workers. Therefore, our results cannot be generalised to the whole population.

Competing interests None.

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How will their airways be? Respiratory health 15 years after the start of apprenticeship

Katja Radon

Workplace exposures to dusts and chemicals in industrialised countries continue to decrease overall (while they remain constant or are even increasing in the developing world). However about 10%–25% of asthma morbidity in adulthood is still estimated to be associated with occupational exposures.[1] Exposures to high molecular weight occupational allergens such as animal antigens, flour, grain dust, and latex and their relevance to health have been extensively studied in the past[2–4] and prospective cohort studies on this topic have also been published.[5 6] What has not yet been prospectively studied over a long period is the association between low molecular weight allergen and irritant exposures and their association with respiratory health in young adults followed from the start of their professional life well into adulthood.[7] So far general population cohort studies and studies among specific trades have indicated that these exposures also contribute to the burden of asthma and rhinitis in adulthood.[1 6 8–12] However as they were mainly confined to small numbers in specific trades or only followed participants for a short period of time knowledge about long-term outcome is limited. Such knowledge is nevertheless important when it comes to career counselling before and during the first years of employment.

In this issue of *OEM* (***see page 237***) Peters and colleagues present the results of such a prospective cohort study which they started in 1988. They followed almost 300 trainees of different British Columbian trade schools (construction, painters, electricians, insulator and machinist apprentices) over a 15-year period.[13] Participants were first followed actively over 2 years while later on data were retrieved from routine registers the British Columbia Linked Health Database. During the first years of follow-up 16 participants were defined as having asthma and 20 were defined as having respiratory symptoms not suggestive of asthma. During the next 13 years outcome was defined based upon the number of physician visits due to respiratory complaints and new asthma/respiratory disease diagnosis. After 13 years the most robust predictor for the outcome under study was a rapid increase in unspecific bronchial responsiveness over the first 2 years of professional life. Bronchial responsiveness at baseline and the development of early symptoms were also associated with the number of physician visits. Based on the type of trade examined the authors suspect that metal-working fluids caused these symptoms. This finding supports data from cross-sectional studies and population-based register data.[12 14]

The results are in line with recent findings in Quebec[5] as well as German results[6] indicating that the first months of employment are important for long-term respiratory morbidity. Whereas sensitisation might be a major predictor of allergic asthma to high-molecular weight agents,[5] unspecific bronchial hyper-responsiveness (BHR) might be more relevant for exposure to low-molecular weight agents and irritants.[13] These studies provide evidence that surveillance as well as thorough career counselling and instruction on personal protection during the first months of occupational exposure are of the utmost importance to prevent occupational asthma. One may recommend that surveillance should be carried out at 6-month intervals during the first year of employment/training and on an annual base thereafter.[6]

We have however to take into account that the positive predictive value of a rapid increase in BHR remains low; in the current study only 25% of asthma patients would have been identified using this approach.[13] Likewise the positive predictive value of BHR at baseline—the strongest predictor of new sensitisation to work-related allergens and incident chest symptoms in the study of Gautrin and colleagues[5] —had positive predictive values of below 25%. Nevertheless limiting surveillance programs to those workers with a rapid increase in BHR during the first months of employment would decrease the number of subjects in screening programs by more than 90%. This would save costs and time as performing a large number of unspecific BHR tests might be challenging in daily practice for an enterprise/occupational physician but some subjects who would later develop respiratory symptoms might still be missed. Nevertheless the high negative predictive value (96%) seems to make this approach ethically acceptable. More evidence however would be needed before reaching a conclusion as the number of cases in this study was small limiting the power of the study. An additional concern is that participants were informed about their individual test results during the first 2 years of the study. While this of course is ethically correct it might influence their healthcare utilisation pattern later on. Furthermore the authors did not verify whether participants stayed in the same job over time

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