Metalworking fluids and occupational respiratory disease risks for machinists

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Introduction

Poor fluid management and the misuse of metalworking fluids (MWFs) in machining can lead to respiratory diseases, including chronic bronchitis, asthma, and Chronic Obstructive Pulmonary Disease (COPD), if proper precautions are not taken. By examining associations between exposure to 'used' MWF mist and respiratory health problems among machinists, it considers the risks posed by chemical and biological contaminants that accumulate in used MWFs and the impact of good-quality MWF management practices on reducing ill health in machinists.

Research methods

This review searched publications from the 1980s to 2023, focusing on workplace health studies. These included studies examining the risk of developing upper airway disease (nose and throat), bronchitis, chronic obstructive pulmonary disease, asthma, occupational hypersensitivity pneumonitis, and bronchiolitis, as well as acute and chronic reductions in lung function. The review also considered animal toxicological studies, particularly those examining the respiratory effects of exposure to used metalworking fluid.

Main findings

Machinists exposed to ‘used MWFs’ have a higher prevalence of respiratory conditions when exposed to concentrations of mist below the now withdrawn UKWorkplace Exposure Limits (WEL) for water-mix MWF and neat oils. Exposure to contaminated water- mix MWF mist may trigger respiratory diseases due to contaminants such as bacteria, endotoxin, and other chemical irritants. Data from occupational disease outbreak studies found a link between exposure and increased risk of Occupational Asthma (OA) and Occupational Hypersensitivity Pneumonitis (OHP).

Discussion and analysis

This review emphasises the critical health risks associated with exposure to MWF mist, reinforcing the need for stringent mist control practices within machining environments. The presence of harmful organisms in MWF suggests that these fluids not only have the potential to cause chronic disease but that their management practices directly influence machinists' health outcomes. The review also concludes that improved quality management of MWFs can lead to better health outcomes for machinists, and workplaces therefore have a responsibility to improve lubricant management practices continuously.

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Conclusion and knowledge gaps

The study concludes that there is a significant need for further research to address knowledge gaps about the prevalence of respiratory diseases among machinists and to evaluate the effects of improved MWF management on their health. Future studies should focus on establishing practical mist-monitoring strategies, understanding the dynamics of biofilm formation in MWF systems, and assessing whether long-term improvements in machinists' health are sustained by maintaining MWF quality.