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Title: Systematic review of job exposure matrix used in population COPD studies

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Body: Introduction In the absence of measured lifetime exposure data, the majority of studies which investigate the occupational burden of COPD rely on Job Exposure Matrices (JEM) to estimate exposures to airborne pollutants. As part of a project with the UK Biobank we are developing a new COPD JEM; here we report a systematic review of the relevant literature. Methods We systematically reviewed and conducted meta-analysis of all occupational COPD studies (1980-2012) which used JEMs to estimate exposures and risks. All articles related to COPD, chronic bronchitis or emphysema defined by lung function and/or respiratory symptoms were included. Results The initial search resulted in 80 studies; 28 were selected for data extraction and 14 for meta-analysis. 12 (43%) of 28 JEM studies were workplace-based. Thirty three different job titles were identified with an elevated risk of COPD. The pooled effect estimate (OR, (95% CI)) of COPD for all airborne exposures was 1.77 (1.68-1.87) with the three highest risks being from exposure to un-specified gases/vapours/dusts/fumes/fibres (1.88, 1.69-2.08), fibres (2.12, 1.90-2.38) and dusts (1.69, 1.53-1.87). The risk was greater for males (1.58, 1.45-1.71) than females (1.39, 0.92-2.12). Conclusion Although JEMs have their limitations they are used extensively in occupational COPD studies to assess the burden of disease, to understand the nature of hazardous pollutants and to identify at-risk industrial sectors/occupations. This paper will discuss the value and findings of JEM COPD studies conducted to date; the different types of JEM used to estimate exposures and the information they provide on industries, jobs and airborne pollutant types associated with occupational COPD.