Cleaning-Related Chemicals And Work-Related Asthma In Healthcare Professionals

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Introduction: Work-related asthma affects one-fourth of all cases of adult asthma. Cleaning substances are routinely used in hospitals. However, few studies have addressed their potential adverse respiratory health effects on healthcare professionals. This study examines the relationship between work-related exposure to cleaning related chemicals and development of work-related asthma among healthcare professionals in Texas.
Methods: Of 5600 licensed healthcare professionals surveyed, 3,650 responded to a validated questionnaire about their occupation, asthma diagnosis, variability of asthma symptoms at and away from work, and exposure to individual cleaning substances. A total of 11 cleaning-related chemicals were grouped into two categories based on common factor analysis: general purpose cleaning and instrument cleaning/sterilization. A working definition of asthma in the workplace was constructed with the following non-overlapping categories: work-related asthma symptoms (WRAS), work-exacerbated (WEA), occupational asthma (OA), and none (reference group). Multivariable multinomial logistic regression analysis was used to evaluate associations between self-reported exposure to cleaning substances and each asthma outcome.
Results: The prevalences of WRAS, WEA and OA were 3.3%, 1.1%, and 0.8%, respectively. For self-reported exposure to individual chemical substances, significantly elevated odds of WRAS were observed for the general purpose cleaning (Adjusted OR (AOR)=3.93, 95%CI=1.66-9.32) and instrument cleaning/sterilization (AOR=2.14, 95%CI=1.06-4.32) exposure constructs. For individual cleaning chemicals that form these exposure constructs, the adjusted odds ratio ranged from as low as 1.48 (95%CI: 0.71-3.07) for formalin/formaldehyde to as high as 4.60 (95%CI: 2.12-9.95) for cleaners used in restrooms and toilets. In addition, seven other general cleaning and instrument cleaning chemicals showed significant associations with WRAS. Similarly, the odds of WEA were almost two-fold (AOR=1.91, 95%CI: 0.71-5.15) and more than three-fold (AOR=3.40, 95%CI: 1.35-8.53) higher for general purpose cleaning and the instrument cleaning/sterilization constructs, respectively. Among the individual chemicals, significant associations were found for exposure to bleach (AOR=3.13, 95%CI:1.08-9.08) and formalin/formaldehyde (AOR=2.66, 95%CI:1.03-6.86). Two or more fold non-significantly elevated odds were observed for detergents, chloramines and ethylene oxide. Lastly, the odds of OA were more than three-fold elevated for exposure to bleach (AOR=3.22, 95%CI: 0.63-16.53) and disinfectants (AOR=3.93, 95%CI: 0.75-20.69), and showed an almost five-fold elevated odds of association with exposure to chloramines (AOR=4.81, 95%CI:1.28-18.06). In addition, a dose response pattern was observed for associations between frequency of cleaning related exposures at the longest held job and WRAS and WEA.
Conclusions: Healthcare workers exposed to cleaning-related chemicals are at increased risk of developing work-related asthma and asthma symptoms.

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