A Job/Task Exposure Matrix of Cleaning and Disinfecting Chemicals for an Epidemiologic Study of Asthma in Healthcare Occupations

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Cleaning and disinfectant products have been identified as important risk factors for asthma, and are used extensively in healthcare; however, quantitative exposure measurements of these etiologic agents are not well characterized. The objective of this study was to quantitatively characterize exposure to cleaning and disinfecting compounds, or their surrogates, and to develop a job/task-exposure matrix (J/TEM) for an epidemiologic study of asthma in healthcare occupations. Exposure assessments were conducted at four hospitals targeting six healthcare occupations: nursing/nursing aides, respiratory therapists, dental assistants/technicians, medical and clinical laboratory technicians, housekeepers, and disinfecting and sterilizing technicians. Area and personal air monitoring was conducted for time-integrated volatile organic compounds (VOCs) and continuous measurements of total VOCs. Tasks performed, products used, manner of application, tools, controls and personal protective equipment use were logged in a task diary at five-minute intervals. A range of VOCs were quantified including chlorinated hydrocarbons, ketones, terpenes, acrylics, alcohols, aromatic and aliphatic hydrocarbons, most of which were in the 1 to 10 parts-per-billion range except for alcohols and m,p-xylene (parts-per-million concentrations). The chemical agents and levels varied by occupation and form the basis for developing an asthma-specific J/TEM for healthcare occupations. The jobs/tasks form the job axis while the chemicals/classes of chemicals form the exposure axis with measured concentrations as cells of the J/TEM. These results will be incorporated into a survey questionnaire to elicit worker-specific information on jobs, tasks, and products used, and together, will be used to develop exposure estimates for the epidemiologic study participants.