Interaction of Respirator (PPE) Type and Respiratory Conditions on Breathing Patterns.

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PURPOSE: Respirators (respiratory personal protective equipment, RPPE) may be widely used for protection in response to epidemics or terrorist threats. This study compares two types: Half–Face Mask Dual Cartridge (HFM) and Filtering Facepiece (N95) during simulated work activities in order to describe the interactions between respirator type and health status (mild Asthma (A), COPD (C), Rhinitis (R), Normal). METHODS: Measurements were made using a respiratory inductive plethysmograph (Vivometrics) during 8 different activities. Data were analyzed using mixed model regression with each physiologic measure as outcome and RPPE, task, disease, and disease*RPPE interaction. Disease was represented by dummy variables for the 3 conditions with Normal as reference. 77 subjects participated. RESULTS: In addition to the main effects of RPPE type and disease per se, there were significant interactions between disease and RPPE type for several physiologic variables, implying that the effect of RPPE varies depending on a user's health status. Significant interactions bewteen disease and RPPE type included: (Minute ventilation: A and R; Tidal volume: A and R; Inspiratory time: A and C; Expiratory time: A and C; Cycle time: A and C). CONCLUSIONS: (1) Respirators should be evaluated with human panels including persons with a variety of respiratory conditions. (2) The optimal respirator for a person may depend upon hs/her health status.

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