Performance of an N95 Filtering Facepiece Respirator and a Surgical Mask Used by Home Attending Health-Care Workers (a Pilot Study)

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Purpose:
This study aimed at determining the Workplace Protection Factor (WPF) for one model of N95 filtering facepiece respirator (FFR) and one model of surgical mask (SM) that are widely used by the home attending health-care workers to reduce their exposure to potentially hazardous agents during home visits, such as respiratory pathogens, aerosolized secretions originated during tracheal suctioning and nebulized medications.

Background:
Home-attending health-care workers are often exposed to various airborne hazards during care activities. This exposure can put them at a health risk. They often enter the homes environments unprotected or at best use SMs or N95 FFRs. Using the personal respiratory protection equipment may mitigate the problem; however, there is no data that would allow assessing whether existing N95 FFRs and SMs can provide an adequate protection to health-care workers during home visits. Generally, workplace protection factor (WPF) is used to determine the protection provided by an N95 FFR and SM to a worker. The WPF is defined as a ratio of the concentration outside of the respirator (C_{out}) to the concentration inside the respirator while worn at a workplace (C_{in}).

Methods:
Three home-attending health-care workers serving in the Cincinnati area were recruited as subjects. Prior to the field experiment, each subject was cleared using the OSHA respirator medical clearance questionnaire and subsequently was fit tested with the selected N95 FFR using the standard OSHA protocol. At the workplace, the aerosol C_{out} and C_{in} of the tested N95 FFR or SM were measured on a subject using two simultaneously operating P-Trak condensation particle counters (Model 8525, TSI Inc., Shoreview, MN) within the particle size range of 20 to > 1,000 nm. The WPF was determined from multiple samples (scans) ranging from 100 to 279, depending on health care procedure. The WPF was determined from multiple samples (scans) ranging from 100 to 279, depending on health care procedure.

Results:
This pilot study demonstrated that the WPF of the N95 FFR consistently exceeded that of the tested SM (with the overall mean WPF values being 56 and 3 respectively). In all cases, the N95 FFR's WPF was above the OSHA' s assigned protection factor of 10 whereas the SM often provided little protection (the WPF ranged from 3 to 9). The protection levels provided by both devices were affected by the activity; e.g., for subject #1 wearing the N95 FFR, the activity-specific WPF was as high as 94 during normal activity and 48 during nebulizer treatment.

Conclusions:
Wearing an N95-certified respirator significantly improves the respiratory protection of home-attending health-care workers (as compared to a SM). The WFP may depend on the activity or body movements or both.

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Pilot Research Training Program (PRP) Overview

Welcome to the University of Cincinnati Education and Research Center's (ERC) 16th Annual Pilot Research Project (PRP) Symposium on October 8-9, 201Welcome to the University of Cincinnati Education and Research Center's (ERC) 17th Annual Pilot Research Project (PRP) Symposium on October 13-14, 2016, held in the Auditorium of Proctor Hall, College of Nursing. The purpose of the PRP is to increase the research capacity of research trainees and young investigators in occupational health and safety and to encourage those in related disciplines to pursue occupational health and safety research.

Under the administrative direction of Dr. Amit Bhattacharya, research proposals are solicited and peer-reviewed annually from qualifying faculty and graduate students from the **University of Cincinnati and the following PRP partnering institutions – Air Force Institute of Technology, Bowling Green State University, University of Toledo – Health Science Campus, Central State University, Purdue University, University of Kentucky, Western Kentucky University, Eastern Kentucky University, Murray State University, Ohio University and Kentucky State University**.

At this symposium, the 2015-16 awardees will be presenting the results of their research and the 2016-17 awardees will make poster presentations of their proposed work. The keynote speaker on Thursday, October 13, 2016 is **Anita Schill, PhD, MPH, MA**, Senior Science Advisor to the Director and Co-Manager for the Total Worker Health® Program with the National Institute for Occupational Safety and Health (NIOSH), will deliver the keynote address on "**Advancing Well-Being Through Total Worker Health.**"

The University of Cincinnati's Education and Research Center is one of 18 such centers funded by the National Institute for Occupational Safety and Health (NIOSH) nationally. Dr. Tiina Reponen serves as the director of the ERC, which is based in the university's Department of Environmental Health within the College of Medicine. The purpose of the ERC is to train professionals in the didactic and research skills necessary to lead the occupational safety and health disciplines. Results of research are translated into action through an outreach program and shared with professionals and practitioners in the region via continuing education.

Since 1999, the PRP program has allocated over $1.3 million to support 222 pilot research projects. These projects have served as a catalyst in bringing over $34 million in additional research support to the region from sources independent of the PRP program, such as, the National Institute for Occupational Safety and Health (NIOSH), National Institutes of Health (NIH), United States

Department of Agriculture (USDA), National Science Foundation (NSF), and the Centers for Disease Control and Prevention (CDC). Additionally, the PRP has brought 47 new investigators from other fields of expertise to the area of occupational safety and health research.

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