Abstract Book

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INNER HARBOR BALTIMORE

May 21-26, 2016 → AIHce2016.org

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2016

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AIHce 2016

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CS-111-04

U.S. Army Medical Research Institute of Infectious Diseases Support in the Ebola Effort

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Situation/Problem: U.S. Army Medical Research Institute of Infectious Diseases played a significant role in assisting the Ebola virus outbreak response in West Africa (on-site laboratory support, diagnostic tools, drug and vaccine research, and biomarkers).

Resolution: Collaboration allows USAMRIID to bring their expertise to bear in responding to an international health crisis.

Results: From on-site laboratory support in Liberia, to training of key personnel, to accelerated research efforts on diagnostic, vaccine and treatment approaches. In addition to providing laboratory testing and training support for the outbreak, USAMRIID provided more than 10,000 Ebola laboratory tests to support laboratory capabilities in Liberia and Sierra Leone. **Lessons learned:** A well-coordinated multiagency response was needed to provide an effective rapid response.

SR-111-05

Acute Symptoms and Exposure to Hydrogen Peroxide, Acetic Acid and Peracetic Acid in Hospital Cleaning Staff

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Objective: Peracetic acid (PAA) is widely used as a disinfectant in healthcare and food production settings, however, occupational PAA exposures have been largely overlooked due to: (1) previous sampling and analytical method limitations and (2) the absence of a current OSHA Permissible Exposure Limit (PEL) or NIOSH Recommended Exposure Limit (REL). In the summer of 2015, NIOSH performed an industrial hygiene survey at a hospital where a new cleaning and disinfectant product, consisting of hydrogen peroxide (HP), acetic acid (AA) and PAA. HP and PAA are strong oxidants and their mixture is listed as an asthmagen and sensitizer by the Association of Occupational and Environmental Clinics. However, few exposure assessment studies to date have measured HP and PAA in a healthcare setting.

Methods: In July and September of 2015, a health and environmental assessment survey was conducted at the hospital. We collected 50 full-shift air samples (41 personal and 9 area samples) and analyzed for HP, AA, and PAA content. We also observed hospital staff performing cleaning duties and noted duration and frequency of cleaning product use. Acute irritation and respiratory symptoms were recorded in a post-shift survey (n = 50). Exposure factors associated with airway symptoms were used to develop recommendations to mitigate potential health risks due to cleaning product exposure.

Results: Partial air sampling results from our July survey ranged from 15-94 ppb for HP, 68-155 ppb for AA and 5-21 ppb for PAA; all measurements for HP and AA were below their respective OSHA PEL or NIOSH REL. Mucus membrane irritation symptoms were reported by 64% (n=32/50) of workers and 84% (n=27/32) reported symptom onset while cleaning. Lower airway symptoms such as cough, wheeze, chest tightness, shortness of breath or difficulty breathing were reported in 34% (n=17/50) of workers, of which, 88% (n=15/17) reported symptom onset during cleaning activities and 82% (n=14/17) worked in areas with high cleaning product use.

Conclusions: Hospital workers using a disinfecting product containing HP, AA and PAA reported work onset airway symptoms despite low levels of measured exposures. Because both HP and PAA are strong oxidants, it is plausible that the mixture of HP and PAA likely contributed to the airway symptoms reported by workers despite low levels of exposure.

SR-111-06

Effect of Multiple Alcohol-Based Hand Rub Treatments on Tensile Strength and Elongation of Thirteen Brands of Medical Exam Nitrile and Latex Gloves

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Objective: Current CDC guidance for the disinfection of gloved hands during personal protective equipment doffing following care of a patient with Ebola allows for multiple applications of alcohol-based hand rub (ABHR) on medical exam gloves. The purpose of this study was to evaluate the effect of ABHR treatments on glove integrity based on changes in tensile properties.

Methods: Thirteen brands of medical exam gloves (8 brands of nitrile and 5 brands of latex from 5 manufacturers), and two different ABHRs containing 70% ethanol and 63% isopropanol, respectively, were included in this study. For each brand, 140 gloves were tested. Thicknesses of the new gloves measured in the palm areas ranged from 0.129 to 0.226 mm among 700 latex gloves and 0.057 to 0.143 mm among 1120 nitrile gloves. A pair of gloves were worn by a test operator and outside surfaces of the gloves were treated with either ABHR for 1 to 6 treatments. Ultimate tensile strength and elongation of the gloves without ABHR treatment and after 1 to 6 treatments were measured based on ASTM D412 standard method by using an Instron Universal Testing Machine with a 500N load cell. Ten replicates were performed and analysis of variance was used for statistical comparison.

Results: Compared to gloves without ABHR treatment, mean tensile strength of the 5 brands of latex gloves decreased 4.3% ($p > 0.05$) after 6 ABHR treatments using ethanol-based hand rub (EBHR) and 18% ($p < 0.05$) using isopropanol-based hand rub (IBHR). Mean elongation increased 2% ($p > 0.05$) and decreased 2% ($p > 0.05$) after 6 treatments using EBHR and IBHR, respectively. For the 8 brands of nitrile gloves after 6 treatments, mean tensile strength decreased 26% ($p < 0.05$) using EBHR and 36% using IBHR ($p < 0.05$). Mean elongation increased 1.7% ($p > 0.05$) using EBHR and 4.8% ($p < 0.05$) using IBHR after 6 treatments. It appeared that changes in the tensile properties increased with each ABHR application. For instance, mean decreases of the tensile strength for the nitrile gloves after 3 and 4 EBHR treatments were 14% and 18% respectively.

Conclusions: The preliminary results indicate that ABHRs had more effect on tensile strength of the tested nitrile than latex gloves. In general, EBHR resulted in lesser changes in tensile strength compared to IBHR. Nevertheless, after up